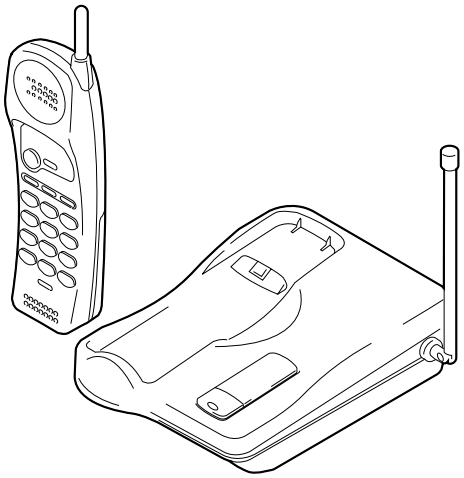
SPP-930

SERVICE MANUAL

US Model
Canadian Model
E Model



SPECIFICATIONS

General

Operating frequency
  900 MHz ISM bands/10 channels
Dial signal
  Tone, 10 PPS (pulse) selectable
Supplied accessories
  See page 7.

Handset

Power source
  Rechargeable battery pack BP-T23
Battery life
  Talk time: Approx. 7 hours
  Standby: Approx. 7 days
Dimensions
  Approx. 2 3/8 x 7 1/4 x 1 1/2 inches (w/h/d), antenna excluded (approx. 60 x 185 x 38 mm)
  Antenna: 1 1/4 inches (32 mm)
Mass
  Approx. 9 oz (approx. 250 g), battery included

Base unit

Power source
  DC 9 V from AC power adaptor
Battery charging time
  Approx. 10 hours
Dimensions
  Approx. 5 1/2 x 2 1/4 x 8 1/2 inches (w/h/d), antenna excluded (approx. 140 x 55 x 215 mm)
  Antenna : Approx. 4 3/4 inches (approx. 120 mm)
Mass
  Approx. 15 oz (approx. 415 g)

Design and specifications are subject to change without notice.

CORDLESS TELEPHONE

MICROFILM

SONY®

TABLE OF CONTENTS

Specifications 1

1. GENERAL
- Location and Function of Controls 3
- Read this first 4
- Step 1 : Checking the package contents 4
- Step 2 : Setting up the base unit 4
- Step 3 : Preparing the battery pack for the handset 5
- Making calls 6
- Receiving calls 6
- Speed dialing 6
- Setting the ringer type 7
- Paging 7
- Mounting the base unit on a wall 7
- Notes on power sources 8
- Maintenance 8

2. DISASSEMBLY
- 2-1. Battery Pack Removal 9
- 2-2. Cabinet (Rear), Hand Removal 9
- 2-3. Hand Main Board Removal 10

3. CIRCUIT OPERATION 11

4. ADJUSTMENTS
- 4-1. Base Unit Section 23
- 4-2. Handset section 25

5. DIAGRAMS
- 5-1. Explanation of IC Terminals 27
- 5-2. Block Diagrams 29
- 5-3. Printed Wiring Boards (Base Unit Section) 34
- 5-4. Schematic Diagram (Base Unit Section) 39
- 5-5. Printed Wiring Boards (Handset Section) 42
- 5-6. Schematic Diagram (Handset Section) 45

6. EXPLODED VIEWS
- 6-1. Base Unit Section 50
- 6-2. Handset Section 51

7. ELECTRICAL PARTS LIST 52

Flexible Circuit Board Repairing

- Keep the temperature of the soldering iron around 270°C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

SAFETY-RELATED COMPONENT WARNING!!

**COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION.
REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.**

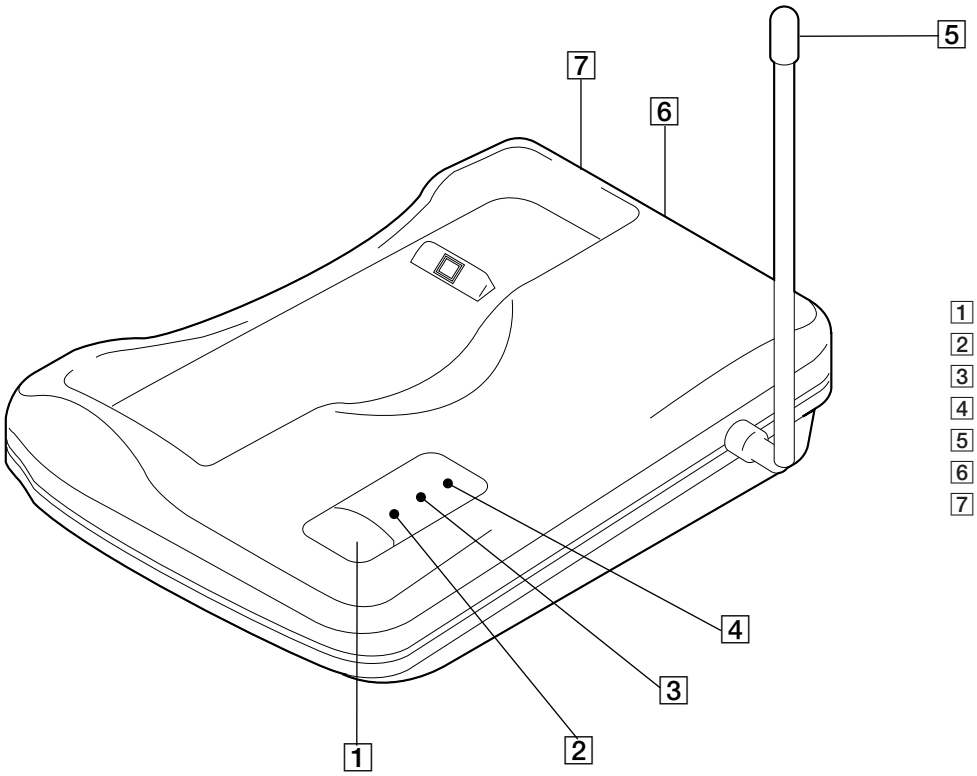
ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SECTION 1
GENERAL

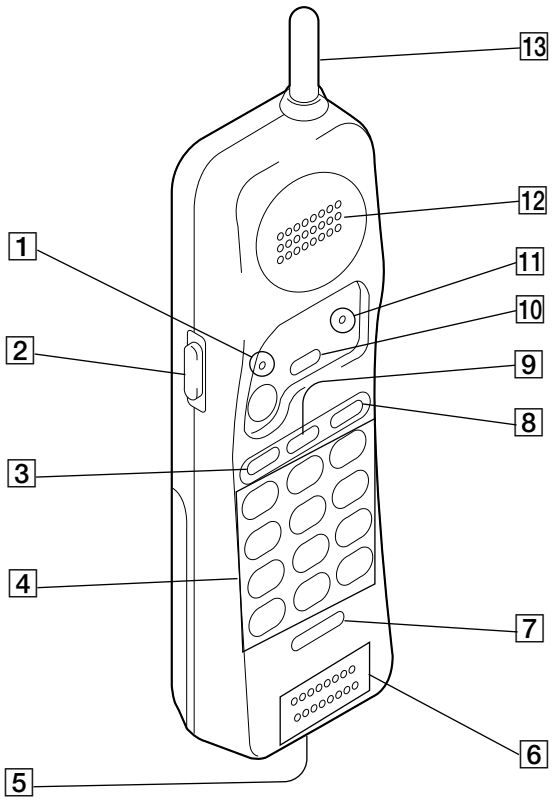
LOCATION AND FUNCTION OF CONTROLS

BASE UNIT



1 PAGE button
2 CHARGE lamp
3 IN USE lamp
4 POWER lamp
5 Antenna
6 DC IN 9V jack
7 LINE (Telephone) jack

HANDSET



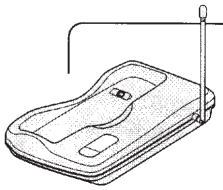
1 TALK lamp
2 VOL(Volume) +/– switch
3 PMG (Program) button
4 Dialing keys
5 Charge terminals
6 Microphone
7 CHANNEL button
8 REDIAL button
9 SPEED DIAL button
10 OFF button
11 BATT Low lamp
12 Speaker
13 Antenna

This section is extracted from instruction manual.

Read this first

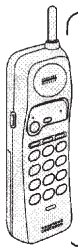
Before you use your phone, you must set it up. Here's a quick way to set up your phone: Step 1, 2 and 3.

Step 1 (page 7)
First, unpack the phone and the supplied accessories.



Step 2 (page 8 to 10)
Next, do three things to set up the base unit.

Base unit



Step 3 (page 11 to 13)
Finally, insert the battery pack into the handset, and place the handset on the base unit to charge the battery pack.

Handset

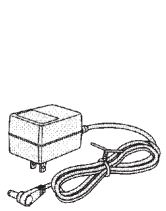
That's it!

About the cordless telephone
Each time you place the handset on the base unit, a random security code is automatically assigned between the base unit and the handset. (The IN USE lamp flashes during the initialization, then turns off when the initialization is complete.) Only a handset which has this unique security code can make calls through the base unit. This system prevents the possibility of other cordless telephone handsets making calls through your base unit.

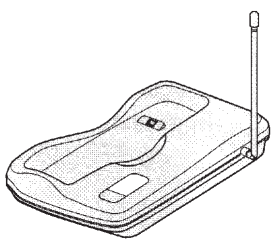
Step 1

Checking the package contents

Make sure you have received the following items in the package.
If anything is missing, contact your local Sony dealer.



AC power adaptor (AC-T120)

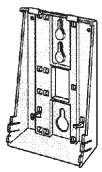


Base unit

Handset

Telephone line cords (2)

Screws and caps (2)



Wall bracket for base unit

Directory

Rechargeable battery pack (BP-T23)

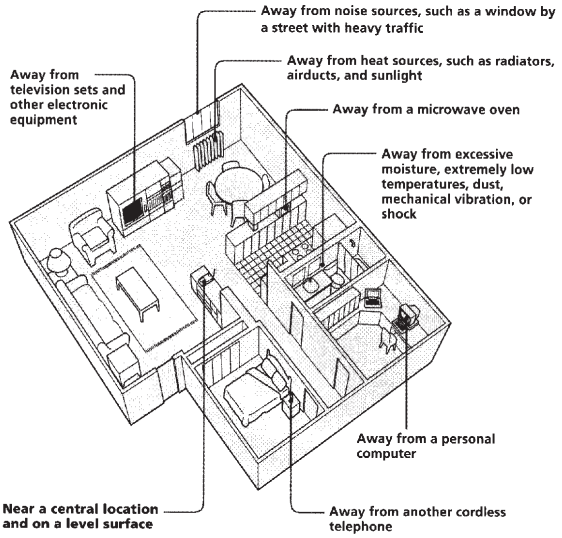
Step 2

Setting up the base unit

Do the following steps:
- Choose the best location
- Connect the base unit
- Choose the dialing mode

Choosing the best location

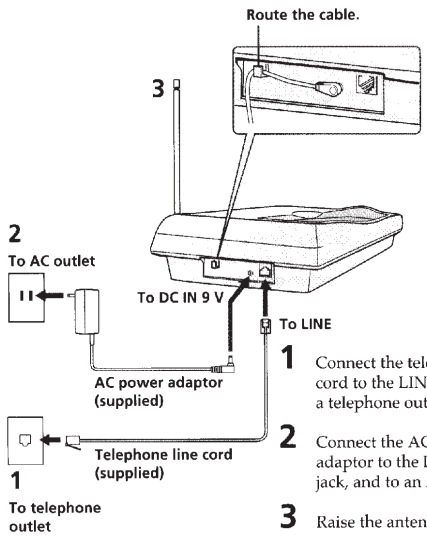
Where you place the base unit affects the reception quality of the handset.


Away from noise sources, such as a window by a street with heavy traffic
Away from heat sources, such as radiators, airducts, and sunlight
Away from television sets and other electronic equipment
Away from a microwave oven
Away from excessive moisture, extremely low temperatures, dust, mechanical vibration, or shock
Away from a personal computer
Near a central location and on a level surface
Away from another cordless telephone

CAUTION: The cordless telephone operates at a frequency that may cause interference to nearby TVs and VCRs; the base unit should not be placed near or on top of a TV or VCR; and if interference is experienced, moving the cordless telephone farther away from the TV or VCR will often reduce or eliminate the interference.

Connecting the base unit

If you want to hang the base unit on the wall, mount the unit first (see page 21).



1 Connect the telephone line cord to the LINE jack, and to a telephone outlet.

2 Connect the AC power adaptor to the DC IN 9V jack, and to an AC outlet.

3 Raise the antenna vertically.

continued

Step 2: Setting up the base unit (continued)

Notes
- Use only the supplied AC-T120 AC power adaptor. Do not use any other AC power adaptor.
- Connect the AC power adaptor to a continuous power supply.
- Place the base unit close to the AC outlet so that you can easily unplug the AC power adaptor.

Polarity of the plug

Tips
- If your telephone outlet isn't modular, contact your telephone service company for assistance.

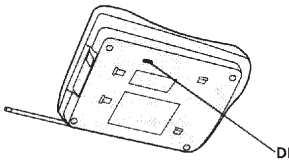
Modular

- If you have two phone lines on a single jack with the first phone line connected to a center pair of wires, and you need to connect the second phone line (outer pair of wires), contact your telephone company for rewiring.

Center pair

Choosing the dialing mode

For the telephone to work properly, select an appropriate dialing mode (tone or pulse).



If you aren't sure of your dialing system

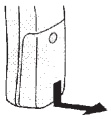
Make a trial call with the DIAL MODE switch set to TONE. If the call connects, leave the switch as it is; otherwise, set to PULSE.

Step 3

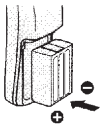
Preparing the battery pack for the handset

Insert the battery pack into the handset, then place the handset on the base unit.

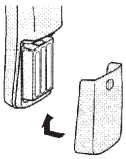
Inserting the battery pack



1 Slide open the battery compartment lid of the handset.



2 Insert the battery pack (with contacts facing down) into the battery compartment.



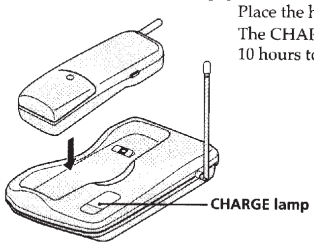
3 Replace the battery compartment lid.

continued

Step 3: Preparing the battery pack for the handset (continued)

Charging the battery pack

Place the handset on the base unit.
The CHARGE lamp lights up. It takes about 10 hours to charge the battery pack.



Battery duration

A fully charged battery pack lasts for about:
- Seven hours when you use the handset continuously.
- Seven days when the handset is in standby mode.

Notes
- The battery pack gradually discharges over a long period of time, even if not in use.
- The CHARGE lamp of the base unit is always lighted when the handset is placed on the base unit, even if the battery pack has been fully charged.

When to charge the battery pack

As long as the handset is placed on the base unit after each call, the battery pack recharges continuously.

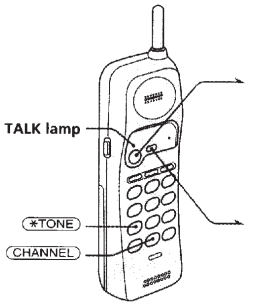
If the handset battery becomes weak

You hear a beep during the conversation, and the BATT LOW lamp on the handset flashes.
The call will disconnect soon. Recharge the battery for more than 10 hours.

When to purchase a new battery pack

If the battery lasts only a few minutes even after 10 hours of charging, the usable life of the battery has expired and needs replacement. Contact your local Sony authorized dealer or service center, and ask for a Sony BP-T23 rechargeable battery pack.

Making calls



1 Press (TALK).
The TALK lamp lights up, then you'll hear a dial tone. If you hear beeps, move closer to the base unit.

2 Dial the phone number.

3 When you're done talking, press (OFF) or replace the handset on the base unit.
The TALK lamp goes off.

Additional tasks

To	Do this
Select a better channel	Press (CHANNEL).
Switch to tone dialing temporarily	Press (*TONE) while using the telephone after you're connected. The line remains in tone dialing until disconnected.

If the handset battery becomes weak during a call

You hear a beep and the BATT LOW lamp on the handset flashes.
The call will disconnect soon. Replace the handset on the base unit to charge.

Notes

- Before dialing, make sure you can hear the dial tone, otherwise you cannot dial correctly.
- When the TALK lamp lights up by pressing (TALK), the IN USE lamp on the base unit lights up simultaneously.

Redialing

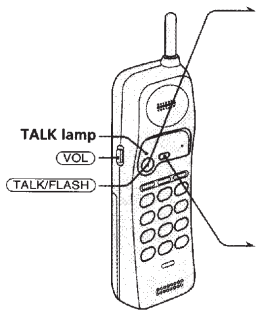
1 Press (TALK).
The TALK lamp lights up.

2 Press (REDIAL) to redial the number last dialed.

Note

If the number last dialed exceeds 16 digits, only the first 16 digits are dialed.

Receiving calls



1 When you hear the phone ring:
- Press (TALK) (or any button except (OFF)).

or

- Pick up the handset from the base unit when the handset is placed on the base unit.

The TALK lamp lights up at the same time the IN USE lamp on the base unit lights up.

2 When you're done talking, press (OFF) or replace the handset on the base unit.
The TALK and IN USElamps go off.

Additional tasks

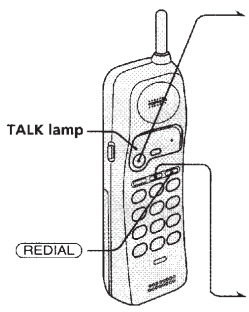
To	Do this
Switch to another call* ("call waiting" service)	Press (TALK/FLASH) to access the flash function. Press the (TALK/FLASH) button again to return to the first caller.
Adjust the volume of incoming calls	Slide (VOL) up or down. High or low volume can be selected.

* You need to subscribe to this service from your telephone company.

Speed dialing

You can dial with a touch of a few buttons by storing a phone number on a dialing button. You can store up to 10 different phone numbers.

Storing phone numbers



1 Press (PGM).
The TALK lamp flashes.

2 Press one of the dialing buttons (⓪ to ⑨) for the phone number to be stored.

3 Enter the phone number you want to store.
You can enter up to 16 digits, including a tone and a pause, each of which is counted as one digit.

4 Press (SPEED DIAL).
You'll hear a long confirmation beep, and the number is stored.
The TALK lamp goes off.

Notes

- In step 3, if you don't enter the phone number, the previously stored number will be erased.
- Do not allow more than 30 seconds to elapse between each step of the procedure.
- The handset must be (OFF) to store phone numbers.

Tip

If you enter a wrong number, start from the beginning.

continued

Speed dialing (continued)

To store the previous number dialed
Press (REDIAL) directly after step 2, then go to step 4.

To store a number to be dialed via Private Branch Exchange (PBX)
Before entering a phone number in step 3 on the previous page, do as follows:

1 Enter the outside line access digit (e.g. 9).

2 Press and hold the number button down before the position where the pause is to be inserted.

For example, 9, pause, 555-1234 would be programmed by pressing and holding the 9 button until it beeps twice, then entering 5, 5, 5, 1, 2, 3, 4. The pause is two seconds in length. To enter a longer pause, press and hold the button down until the handset beeps three or four times. Each additional beep indicates an additional two second pause.

Note
Each pause is counted as a digit.

To change a stored number
To store a new number, follow the instructions described on the previous page.

Making calls with speed dialing

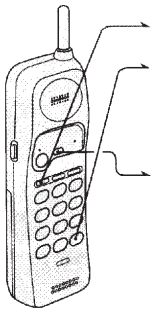
1 Press (TALK).
The TALK lamp lights up.

2 Press (SPEED DIAL).

3 Enter the desired speed dialing number (① to ⑨).
The phone number stored in the speed dialing number will be dialed.

Setting the ringer type

You can select a ringer type from four types.



1 Press (PGM).
2 Press (#).
3 Press a number button, (1) to (4), to select a ringer type.
4 Press (OFF).

Turning off the ringer

1 Press (PGM).
2 Press (#).
3 Press (5).
4 Press (OFF).
The ringer on the handset is turned off.

To turn the ringer on again
Follow the instructions described in "Setting the ringer type."

continued

Setting the ringer type (continued)

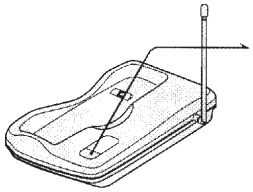
Checking the ringer type

1 Press (PGM).
2 Press (#).
3 Press (0).
The currently selected ringer sounds.
4 Press (OFF).

Note
If you hear no sound (only key beep), the ringer on the handset has been turned off.

Paging

You can page from the base unit to the handset.



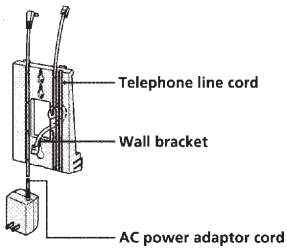
Press (PAGE).
The base unit rings the handset four times before automatically ending the page. To end the page at the base unit, press (PAGE).

Note
If a call comes in during paging, paging is cancelled.

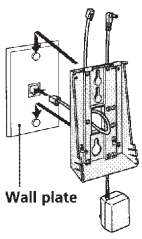
Tip
To end a page at the handset, press (OFF).

Additional Information

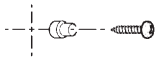
Mounting the base unit on a wall

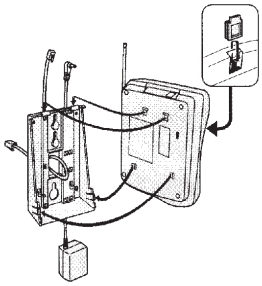


1 Attach the AC power adaptor cord and the telephone line cord to the wall bracket.



2 Hook the wall bracket to the wall plate, and plug the telephone line cord into the telephone outlet.
If the wall plate is not available, use the two screws provided to mount the bracket.





3 Insert the upper tabs first, then press down the base unit so that the lower tabs on the bracket go into the base unit. Then, raise the antenna vertically and attach the hang-up tab upside down.

Notes on power sources

On battery pack

- Store the battery pack at a temperature between 41°F (5°C) and 95°F (35°C) for best performance.
- If you don't use the handset for a long period of time, remove the battery pack.

On power failure

- During a power interruption, the base unit won't operate, and a phone conversation can't be made on the handset.

RECYCLING NICKEL-CADMIUM BATTERIES

NICKEL-CADMIUM BATTERY. MUST BE DISPOSED OF PROPERLY.

Ni-Cd

Nickel-Cadmium batteries are recyclable. You can help preserve our environment by returning your unwanted batteries to your nearest Sony Service Center or Factory Service Center for collection, recycling or proper disposal.
Note: In some areas the disposal of nickel-cadmium batteries in household or business trash may be prohibited.
For the Sony Service Center nearest you call 1-800-222-SONY (United States only)
Caution: Do not handle damaged or leaking nickel-cadmium batteries.

Maintenance

- Clean the surface with a soft cloth slightly moistened with water or a mild detergent solution. Do not use any type of abrasive pad, scouring powder or solvent, such as alcohol or benzine, as they may damage the surface.
- If the terminals (metal parts on the base unit and the handset) are soiled, wipe them with a soft cloth or paper.

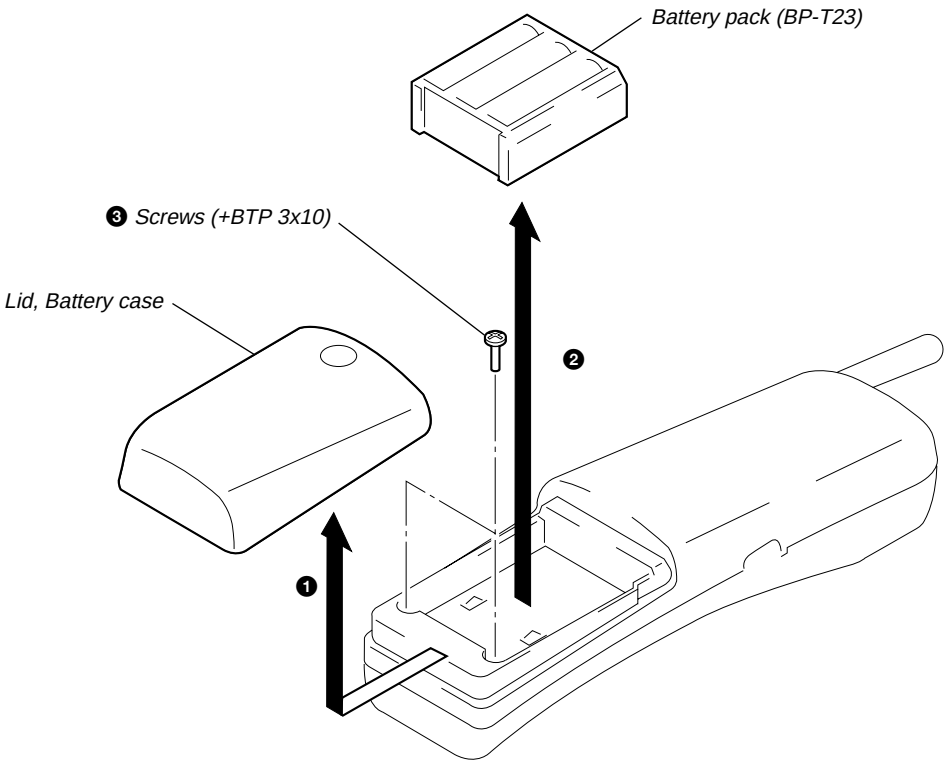
If you have any questions or problems concerning your phone, please consult your nearest Sony dealer.

SECTION 2
DISASSEMBLY

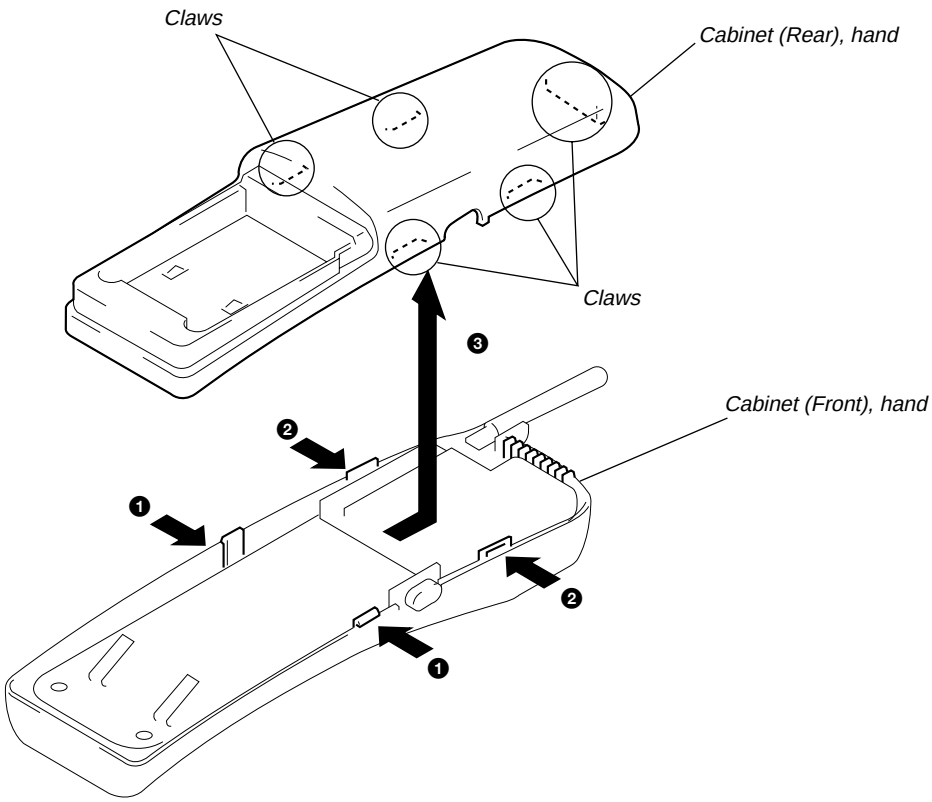
Note : Follow the disassembly procedure in the numerical order given.

HANDSET SECTION

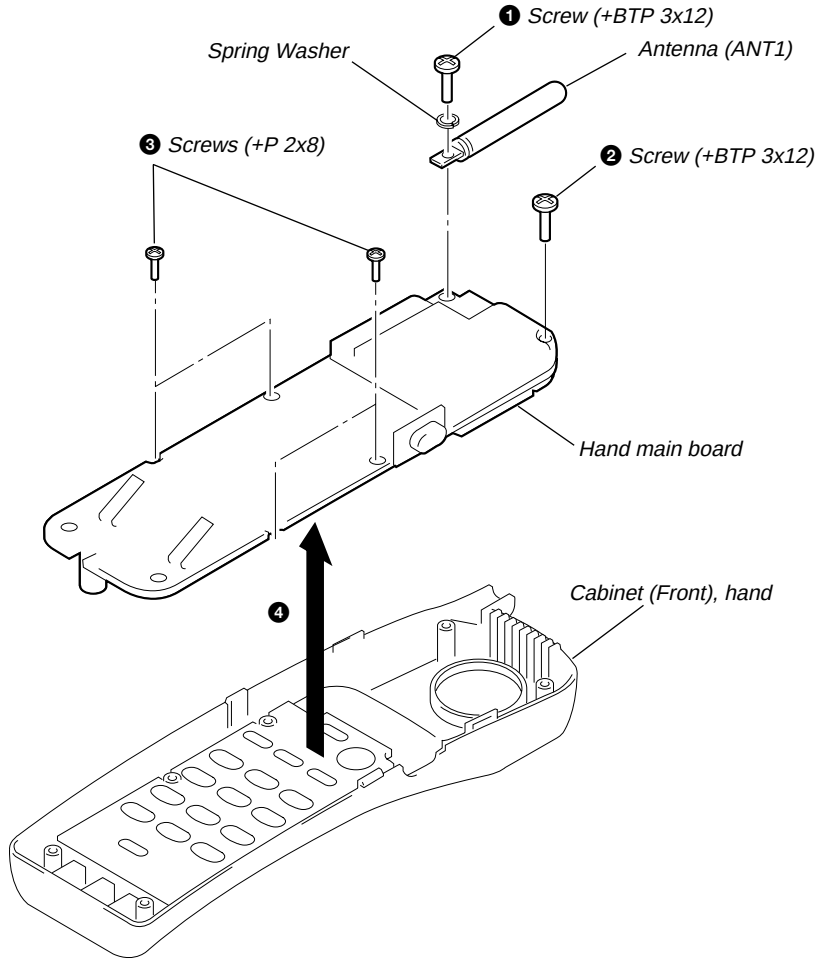
2-1. BATTERY PACK REMOVAL



2-2. CABINET (REAR), HAND REMOVAL



2-3. HAND MAIN BOARD REMOVAL



SECTION 3
CIRCUIT OPERATION

FUNCTIONAL OVERVIEW

1.0 Introduction

The basic function of the RF circuits on both handset and base is to provide a full duplex wireless link between the handset and base sections of the telephone. This is accomplished by setting up two simultaneous communications links between the handset and base RF sections. The RF receiver and transmitter circuitry essentially provide a link between the microphone and speaker in the handset to the telephone line in the base set. In this way the phone performs exactly as a corded phone, except without the cord.

The frequency at which the handset (operating at 3V) transmits to the base is centered around 925.65MHz, and the frequency at which the base(operating at 5V) transmits to the handset is centered around 903.5MHz. This Machine uses a wideband FM modulation scheme to directly modulate audio signals onto the RF carriers.

The following section will outline the transmit frequencies used by this Machine RF section as well as the corresponding LO frequencies which are used for the receivers. This is followed by the Block diagram and a block by block functional description of the modules.

1.1 Frequency Tables

This section outlines the frequencies and corresponding channel numbers used by the RF Module. The handset uses a high side LO while the base uses a low side LO to down-convert the incoming signal.

l.1.1 Handset

Channel	Transmit (MHz)	Receive (MHz)	RX LO (MHz)
1	925.05	902.3	913.0
2	925.35	902.6	913.3
3	925.65	902.9	913.6
4	925.95	903.2	913.9
5	926.25	903.5	914.2
6	926.55	903.8	914.5
7	926.85	904.1	914.8
8	927.15	904.4	915.1
9	927.45	904.7	915.4
10	927.75	905.0	915.7

1.1.2 Base

Channel	Transmit (MHz)	Receive (MHz)	RX LO (MHz)
1	902.3	925.05	914.35
2	902.6	925.35	914.65
3	902.9	925.65	914.95
4	903.2	925.95	915.25
5	903.5	926.25	915.55
6	903.8	926.55	915.85
7	904.1	926.85	916.15
8	904.4	927.15	916.45
9	904.7	927.45	916.75
10	905.0	927.75	917.05

1.2 Block Diagram

Both the handset and base RF modules follow the same block diagram shown below with only minor changes to incorporate the different transmit and receive frequencies.

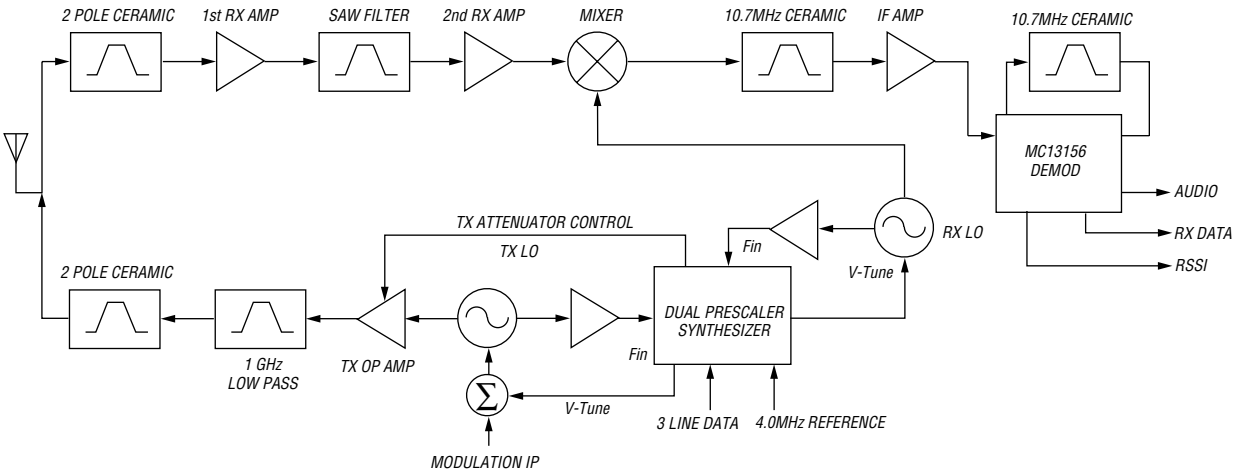


Figure 1. RF module Block Diagram.

As can be seen by the block diagram, there are 7 important input/output signals which are necessary for operation of the RF section (this does not include the separate supply lines for both TX and RX sections). A 4.0MHz reference is present for use in the frequency synthesizers. The accuracy of this 4.0MHz input will affect the transmit and receive frequencies. In order to ensure proper operation of the RF module, the 4.0 MHz reference signal must be at least 1.1Vp-p in amplitude. Also present is the 3-1ine Data (SPI) bus on which data is transferred to the synthesizers to set both the transmit and receive frequencies. An external port of the synthesizer IC is also under SPI bus control which is used to enable/disable the bias on the TX amplifier stage. The TX amplifier bias is disabled briefly during channel change operation in order to reduce the effect of TX carrier jitters.

The modulation input allows analog voice and digital data (signalling) to be modulated directly onto the TX carrier. There are three outputs from the RF module, Audio, RX Data and RSSI. The RX Data output is the demodulated signal after being filtered and shaped by a comparator. The Audio output is the recovered analog voice modulation which is sent to the audio circuits for additional processing. The RSSI output gives an indication of received signal strength. This is set to be high when the input signal is –90dBm or less at the antenna.

The RF module performs a single down-conversion of the incoming RF signal to 10.7MHz where it is demodulated. The transmit section directly modulates the RF carrier.

The following section explains the individual blocks in the RF module in detail. All references to part numbers correspond to the handset schematic.

DETAILED OPERATION

2.1 Antenna Section

2.1.1 Antenna

The antenna is a device which allows effective conversion of energy from air to the RF module circuitry. The base antenna is a 1/2 wave with approximately 0dB gain relative to an isotropic radiator, while the handset is a l/4 wave with approximately –3dB gain. The duplexer and filters which follow the Antenna, require a 50Ω match to operate properly. The Antenna is not matched to 50Ω and requires a simple microstrip matching network to achieve this. If a network analyzer is attached to the BFA connector after disconnecting the duplexer, the antenna match may be measured. In order to achieve a good 50Ω match, one must be careful not to obstruct the antenna as any object near the antenna will affect its impedance.

2.1.2 Duplexer

The Duplexer ensures that the two bandpass filters do not interact with each other. It accomplishes this by making each filter see a high impedance from the opposite filter in its own passband. This is necessary to ensure that both filters work effectively when connected together. If the Duplexer were not present, mismatches from one filter would cause the passband of the other to be distorted and this would degrade performance.

The Duplexer itself is simply composed of two microstrip and discrete filters which shift each filters out of band match to a high impedance. To ensure that the Duplexer is operating correctly, the match looking into the filters from the BFA connector may be measured. To do this it is necessary to remove the 0Ω resistor which connects the antenna to the Duplexer. A return loss of approximately 15dB should be measured for both the TX and RX bands.

2.1.3 RX, TX Bandpass Filters

The RX and TX bandpass filters provide two functions. The first is to effectively pass the correct frequencies to the RX and TX sections of the RF module. It is important especially for the RX section that these filters have a low insertion loss in order to ensure a low front end noise figure. These filters are also designed to provide >25 dB rejection for the opposite band. This means that the transmit carrier will be attenuated by at least 25dB before entering the receive section of the phone. A plot of the low band filter is shown below.

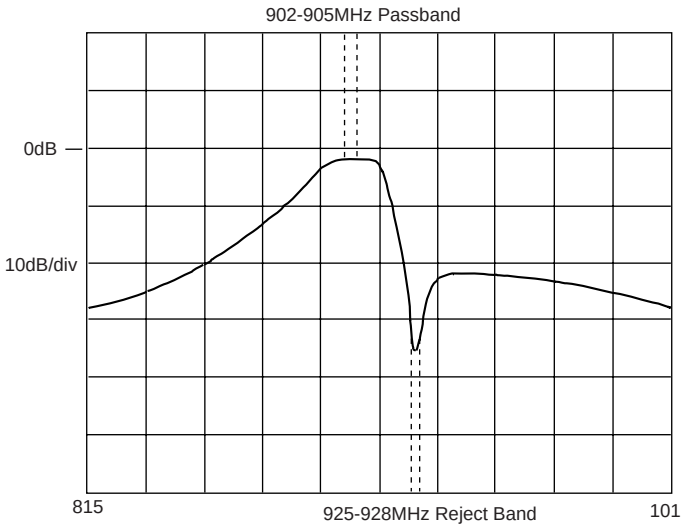


Figure 2 Low band Ceramic filer response.

For this filter the insertion loss is less than 3dB at 902 to 905MHz while the 925-928MHZ band has >25dB attenuation. This filter is used for the RX filter in the handset or the TX filter in the base. The high band filter characteristic is shown below. This filter is used for the handset TX filter and base RX filter.

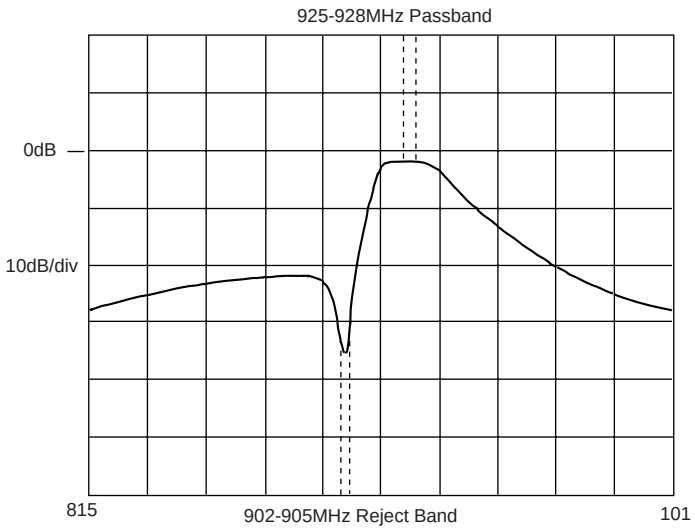


Figure 3. Hight band ceramic filter Response.

2.2 Receive Section

2.2.1 RX Amps and SAW Filter

The purpose of the first RX amp is to provide enough gain that the noise figure of the RX section is fixed to a value as low as possible. It must provide a good 50Ω match to both the RX bandpass filter and the SAW filter. This amplifier must also have good power handling capability due to the limited filtering which precedes it. The design employs a collector inductor to improve the output power capability of the transistor. This form of matching also ensures that the gain of this stage is not too wide band further improving its performance by allowing it to effectively reject signals which are far out of its passband.

Directly following the first RX amp is the SAW filter. This filter is responsible for the bulk of the filtering in the receive section. It provides more than 40dB of image rejection and TX carrier suppression. The insertion loss of this filter is relatively high due to its SAW implementation. It has an insertion loss of less than 5dB, typically 4dB. An amplifier is required before this SAW filter to keep the noise figure low. If it were not present, the noise figure of the phone would increase by the 4dB loss associated with the SAW filter.

The second RX amp provides a limited amount of gain. Its main function is to ensure that the mixer sees a good wideband match. Measuring the RX gain from the BFA connector to the output of this amplifier will produce results as shown in Figure 4 below.

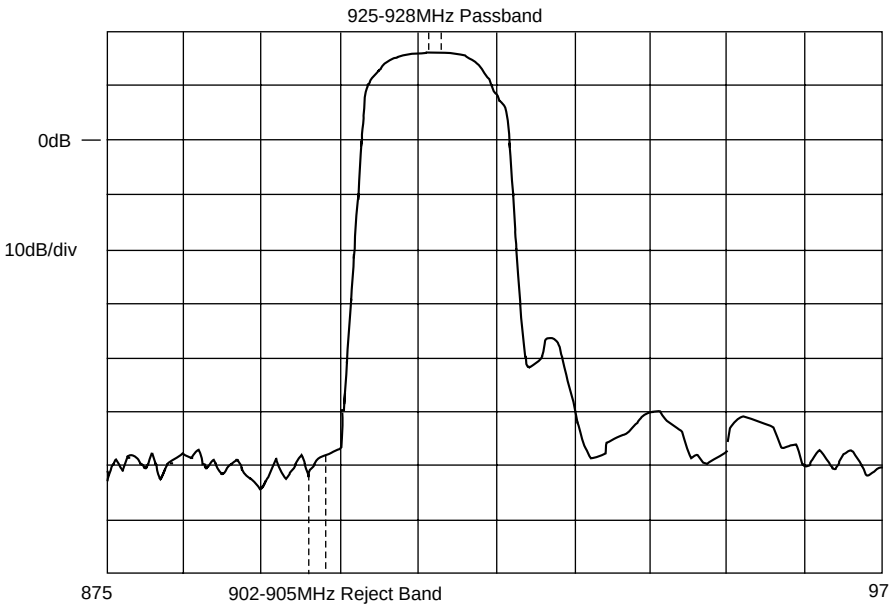


Figure 4. RX Front end Response.

2.2.2 RX Mixer

The function of the mixer is to combine the incoming signal with a LO signal in order to convert the desired signal to the 10.7MHz IF frequency. The mixer used for this task is a dual gate FET (CF739R). The LO and RF signals are placed on the gates of the FET and the IF signal is coupled off of the drain. The FET provides conversion gain along with adequate power handling characteristics. Both the RF and LO ports are shorted to ground by rectangular microstrip inductors. These inductors provide a high impedance at both the RF and LO frequencies while presenting a very low impedance at the IF frequency. The mixer is followed by an emitter follower which converts the high impedance output of the mixer to a 330Ω output suitable for directly driving the IF ceramic filters. The gain for the pair (mixer and follower) is about 6dB (50Ω in, 330Ω out).

2.2.3 RX VCO and LO Buffer

The RX VCO is a Colpitt's type oscillator operating at about 450MHz with a frequency selective network tuned to about 900MHz on the collector. The frequency of oscillation is controlled by a varactor diode in the tank circuit connected to the base of the transistor. This diode is connected to the loop voltage from the RX synthesizer. Rough tuning is achieved with a variable chip cap.
This capacitor is used to center the tuning voltage to ensure reliable operation over a wide temperature range and also to compensate for variations in component values.

The 450MHz LO for the PLL is coupled off of the emitter of the VCO transistor. This is lightly coupled to ensure that the VCO is not loaded by the PLL. The LO Buffer isolates the PLL from the VCO preventing the TX VCO from interfering with the RX VCO and vice versa. The 900MHz RX LO signal for the Mixer is coupled off the collector of the VCO transistor.

2.2.4 RX Synthesizer

The PLL and prescaler for both the TX and RX sides are combined into one IC. The Synthesizer receives channel information from the audio board through the SPI buss. It also requires a stable 4.0MHz reference which is supplied from the MCU section.

A passive loop filter is employed to connect the synthesizer to the VCO. This tuning voltage may be observed at the ATE test point connector. This voltage should nominally be set to 2.0V for the base and 1.2V for the handset by adjusting the oscillator frequency with the variable capacitor. The loop filter cutoff frequency is set to about 1kHz to allow relatively fast power-up times.

2.2.5 IF Amplifier Stage

There is only one stage of discrete IF amplification. Transistor Q6 is used as an amplifier with 330Ω input and output impedance. The rest of the IF gain is provided by the FM demod IC discussed below.

2.2.6 IF Filtering

The choice of l0.7MHz as an IF frequency, allows the use of relatively inexpensive filters. Two ceramic filters are used to achieve the desired adjacent channel suppression. Two different bandwidth filters are used, 230kHz and 150kHz, so that any shifting in the passband does not reduce the bandwidth excessively.

2.2.7 Demodulator, Data comparator, RSSI Comparator

This RF board uses a MC13156 FM demodulator. It incorporates all three of the above functions into a single IC.

The Quadrature circuit is made up of L13, C87, C136 and C48, C87 is a variable capacitor and allows tuning of the circuit. The Quadrature voltage may be observed at the ATE test point connector. This voltage should nominally be 2.2V for the base and 1.2V for the handset when a signal is center tuned.

The recovered audio signal from the demodulator has a peak to peak amplitude of approx. 0.5V (for 50kHz p-p modulation). One path from the recovered audio port is filtered through a lowpass data filter and passed back into the data comparator. The output of the data comparator is fed into the MPU for processing.

The RSSI current from the demodulator is fed through a variable resistor which sets the threshold voltage for the RSSI comparator inside the IC.

2.3 Transmit Section

2.3.1 TX Amps and Attenuator

There is one transistor which provides the necessary gain for the transmit section. Transistor Q1 amplifies the signal from the TX VCO to apply the correct output power into the antenna. (-5dBm for both handset and base)

Transistor Q3 provides a switchable attenuator to control the output power during power up or channel change before the PLL locks onto the correct channel.

2.3.2 TX VCO

The basic operation of the TX VCO is the same as the RX VCO, except for one detail. The TX VCO is also modulated by the transmit voice and data through a second varactor in the tank. The audio deviation is adjusted to a nominal value of 50kHz p-p by adjusting R119.

2.3.3 TX Synthesizer/PLL

The TX PLL is combined into one IC with the RX PLL. See above.
The loop filter cutoff frequency is about 100 Hz. This allows the data and audio modulation to include frequencies down to about 100 Hz. The power-up time of the TX PLL is not critical.

BASE UNIT SECTION

3.1 Introduction

This Machine is a 900MHz analog cordless telephone. The phone was developed with low cost and high performance in mind. The phone minimizes costs by using analog speech transmission and by utilizing a number of design innovations that reduce production costs. The speech transmission differs from our digital phones in that digital speech encoding and decoding does not occur in speech transmissions. This means that elaborate software algorithms and additional hardware are avoided in the design.

This Machine base unit is a single PC board design. All RF, audio, MCU control and power management components are placed on a single PC board. The use of a single PC board reduces costs associated with ATE testing, handling and assembling. This document describes the technical aspects and operation of this Machine base unit.

3.2 Telephone Line Interface

The analog this Machine low cost phone's telephone line interface couples audio and line signaling to and from the telephone line while isolating the phone from the telephone line. The interface provides basic 2-wire to 4-wire conversion for the audio and facilitates pulse dialing and ring detection. Isolation is achieved by inductively coupling audio through a transformer and by coupling line signaling through opto-couplers. The isolation is necessary for the phone to meet the FCC 1.5kV high-pot requirement. The interface also provides protection from high voltage transients and surge currents.

3.2.1 Line Protection and Filtering

The audio signal from the central office or PABX is carried by the telephone line (tip and ring) to the phonejack. The two lines are also used to carry the ring signal (40 - 150 VRMS, 15.3 - 68 Hz) and various line signaling (i.e.., DTMF, dial tone, etc.). After the phone jack, inductors are installed to reduce the effect of EM fields that could find its way onto the telephone line. The inductors also serve to minimize any undesired RF emissions that could escape from the phone and onto the telephone line. Inductors are also installed near the power jack to isolate the power line from similar high frequency signals.

A fuse is installed in the telephone loop to limit the loop current to no greater than 250mA. A varistor is used to limit the voltage across the line interface when a high voltage transient appears on the telephone line (i.e., lightning strikes). Further high voltage protection (1.5kV) is afforded by the audio transformer's isolation and high voltage spark gaps found in the layout of the PC board. The voltage spark gaps are designed to arc across at about 2kV allowing the phone to undergo the 1.5kV hi-pot test while preventing component damage from higher voltages.

3.2.2 Ring Detect

The ring signal across the tip and ring is detected by an AC coupled opto-coupler. Zener diodes are used to set the threshold detection voltage and to meet the no-ring response/impedance requirement for EIA-470. Resistors limit the current flow into the opto-coupler and maintain the necessary ringing impedance as specified in EIA-470. The diode across the opto-coupler input provides a discharge path for the coupling capacitor during negative ring cycles.

On the opto-coupler output side, a pull up resistor is used to set the transistor's collector current (i.e., sensitivity control) when a ring signal is detected. The output of the opto-coupler is connected to the MCU where the ring signal is analyzed for validity. A typical ringing pattern from the central office is one second ON and four seconds OFF. The presence of a ringing signal at the base is indicated by flashing the "In Use" LED.

3.2.3 Pulse Dialing or Off-Hook Switch

For pulse dialing (8-11 PPS, 58-64% break, interval 53-80 ms), an opto-coupler is used to make and break the telephone line loop. In order for the phone to function normally irrespective of the polarity on the tip and ring, a diode bridge is used to ensure the potential on the collector of the opto-coupler is positive with respect to its emitter. The opto-coupler input is connected to the MCU from which the required state of the opto-coupler is controlled. For pulse dialing, the opto-coupler is simply pulsed off and on at the appropriate rate. To set the phone off-hook, the opto-coupler is activated which closes the telephone loop. The off-hook condition is indicated by turning on an LED on the base labeled "In Use".

3.2.4 Speech Circuit

To minimize costs, a speech network IC is not used in this Machine design. Instead, an isolation transformer with supporting hardware is used to provide all the speech network functions. The speech circuit provides line impedance matching. 2-wire to 4-wire conversion and sidetone cancellation.

Matching (or return loss) is at its best when the termination impedance equals the source impedance. The effective impedance looking into this Machine is a combination of the component impedances in the line interface. This effective Impedance was derived empirically by fine tuning the resistor across the audio transformer's secondary. The speech circuit matches a line impedance of 600 Ω (EIA-470 : 4.5.2.3) while the transmit, receive and sidetone frequency responses are set with a 900Ω line impedance (EIA-470 : 4. l. 1 - 4.1.3).

The 2-wire to 4-wire (or 4 to 2) conversion is accomplished by transmitting audio to the transformer's secondary via a uni-directional buffer and receiving audio directly from the transformer's secondary. The uni-directional buffer is a common emitter transistor amplifier whose high impedance collector, which is connected to the transformer, prevents received audio from entering the transmit path while allowing transmit audio to pass to the transformer.

Sidetone cancellation is accomplished by taking the reflected transmit audio (the sidetone) and resistively combining it with out-of-phase transmit audio. In a real-world situation, the match between the line interface and the telephone line is not perfect. This slight mis-match results in some transmit audio being reflected back in the receive direction. The sidetone cancellation signal is created by tapping off the signal found on the emitter resistor of the transistor amplifier which is inherently 180° out of phase with the transistor's collector (i.e., the sidetone source).

3.3 Power Management

This Machine base power circuits consists of DC power regulation and charging circuits for the handset and spare batteries. The base unit operates on a regulated 5VDC power supply. The power is supplied to the regulator via a UL approved 9VDC, 300mA power adapter. During normal operation, the base unit draws about 100mA of current (add 30mA with the spare battery and add 60mA when the handset is in the cradle).

3.3.1 Power Supply

DC power is supplied to the base via a UL approved AC to DC power adapter rated at 9VDC, 300mA. The power from the adapter is then regulated down to 5VDC. Filter capacitors are connected to both sides of the 5VDC regulator to ensure AC variations are eliminated from the power lines. An LED is used to indicate the presence of the 5VDC supply.

3.3.2 Handset Charge Circuit

To reduce costs by keeping circuits simple, the handset charge circuit is designed to supply a charging current to a cradled handset regardless of whether the battery is fully charged or not. This current varies with the charge on the battery and is limited to 0.1C or 10% of the batteries capacity by a limiting resistor.

In this Machine, the handset battery has a capacity of 600mA, thus the maximum charging current is set to approximately 60mA. The specification of 0.1C allows a battery to be constantly charged without damaging the battery. The handset charge circuit components have been selected to withstand shorting the charge contacts on the cradle. The handset charge circuit also provides a signal to the MCU for cradle detection and an LED labeled, "Charge" , to indicate the on-cradle condition.

3.3.3 Spare Battery Charge Circuit

This Machine features a spare battery charger. The circuit for this charger is similar to that of the handset charger except that the charging current has been limited to 0.05C or 30mA. The lower limit has been implemented to accommodate prolonged charging. As with the handset charger, this charging circuit also activates an LED (labeled, "Spare Bat") when a spare battery is placed in the charger.

Note, the spare battery <u>does not</u> supply any power to the base circuits in the event of a power failure.

3.3.4 ESD Protection

The charge contacts for the spare battery and handset are vulnerable to ESD because they of their exposure to the outside world. Since the contacts are connected directly to the base's circuits. ESD can damage some of the base's internal circuits if no protection is implemented. Therefore, a number of measures have been taken to protect internal circuits from ESD damage.

Since the MCU is connected directly to a charge contact and its ground reference is connected to another, care must be taken to prevent ESD from damaging the MCU and corrupting the ground reference. All charge contacts have LC filtering on them to bypass ESD. Low voltage spark gaps (arc at – 200V based on 1kV/mm electric discharge through air) are also implemented in the PC board layout between the charge contacts and a special ESD ground. This ESD ground channels any ESD discharge directly to the AC adapter preventing discharges from entering the main circuits. A spark gap can also be found between the ESD ground and the antenna.

3.4 Audio Circuits

Audio circuits are necessary to condition speech for RF transmission and reception. The conditioning includes amplification, filtering, pre-emphasis/de-emphasis and compression/expansion, all of which ensures that the speech is received and transmitted with maximum clarity and legibility.

Pre-emphasis/de-emphasis is used to improve signal-to-noise ratio which is, as a consequence of frequency or phase modulation, degraded at high audio frequencies. Compression/expansion is also used to improve the perceived signal-to-noise ratio by reducing the noise vulnerability of low level signals. The compression process amplifies low level signals more than it does for high level signals. Thus, by compressing the dynamic range of the audio before transmission, noise picked up during transmission has less of an effect on the low level signals. After receiving the transmission, the expansion process maintains this improved signal-to-noise ratio while restoring the low level signals back to their original levels.

The audio circuits are implemented around a compandor IC (TA31103F). The IC provides compression/expansion, amplification and muting all in a clean, simple package. The IC is a good compromise between the parts cost, flexibility, size, and performance. Refer to the IC's data sheets for a detailed description of its operation.

3.4.1 Transmit Direction (from RF module to telephone line)

The transmit audio is transmitted from the handset to the base using frequency modulation (FM). The FM signal from the handset enters the base's RF module where the signal undergoes filtering, downconversion and finally demodulation. The baseband audio

then leaves the RF module via the demodulator IC at about -16dBv (for a deviation of +/- 25kHz). From the RF module, the audio is then fed into a buffer amplifier where the audio is lowpass filtered and directed to both an audio channel and a data channel. The audio undergoes this split in directions after the buffer amplifier because both data and audio share the same circuits upto and including the buffer amplifier. The filtering at the buffer amplifier provides some rejection at higher frequencies (> 40kHz).

The buffer amplifier output is connected to an active third order lowpass filter with a - 3dB cut-off set at about 5.5kHz. The filter has unity gain in its passband. The filtered audio is then passed to an active de-emphasis filter where de-emphasis occurs across the entire audio band (300Hz to 3,400kHz) at a rate of 6dB/octave or 20dB/decade. After de-emphasis, the audio undergoes the expansion process and is passed through a transmit audio level control. The level control which has a range of about 12dB, is used to set the transmit audio level at the tip and ring of the telephone line. The transmit level can vary from component tolerances and variations.

After the level control, the audio is passed to a final stage of amplification. The output of this amplifier can be taken differentially, but is taken single ended because of the amplifier's adequate power capacity. From this amplifier, the audio is coupled to the transistor amplifier which leads to the rest of the speech circuit and telephone interface. The output of the DTMF generator circuit is also coupled in at the input to this final stage of amplification.

The transmit audio chain can be disabled at the expander amplifier by a mute function on the compander IC. This function is used to mute the transmit audio chain when data is being received from the handset so that data noise does not enter the telephone line. To minimize costs, the transmit audio mute function also simultaneously disables some of the receive audio circuits. When transmitting data from the base to the handset the mute function is used to disable the receive audio circuits.

3.4.2 Receive Direction (telephone line to RF module)

The receive audio signal from the telephone line makes its way through the line interface and the speech circuit before reaching the receive direction audio circuits. From the speech circuit, the audio undergoes a first stage of amplification and light lowpass filtering. Following the amplifier, the receive audio is compressed and fed directly to the pre-emphasis stage. The compressor does a straight 2 to l conversion, the dynamic range is reduced by one half. The compressor amplifier is also used to sum in DTMF feedback so that the tones can be heard from the handset's receiver. Pulse dialing feedback is accomplished similarly by summing in the hook switch signal level at the same location.

From the compressor output, the receive audio signal enters a pre-emphasis circuit with an integrated level control. The pre-emphasis like the de-emphasis is set at a rate of 6dB/octave or 20dB/decade throughout the entire audio band (300Hz to 3,400Hz). The level control , as in the transmit direction, has a range of about 12dB and is used to set the level applied to the RF module. This level control thus sets the FM deviation and is necessary to compensate for component tolerances and variations in the sensitivity of the FM circuits.

Transmit data is resistively combined in just before the level control from which point it shares the rest of the audio circuits with the receive audio. However, either only audio or only data will be present at any given time to prevent corruption of the signals. To further minimize the chance of data corruption, the receive audio circuits are disabled at the compressor using the mute function as mentioned in the previous section. Muting this part of the receive audio chain ensures that any noise or signals on the telephone line do not interfere with data transmissions to the handset.

Following the receive audio level control (or deviation adjust), the audio goes through another stage of amplification and light lowpass filtering before being passed to an active 3rd order lowpass filter. The filter's -3dB cut-off is set to approximately 6.7kHz and has unity gain in the passband. The 3rd order lowpass filter's output is then coupled to the RF module's frequency modulator.

3.5 MCU Circuits

A relatively inexpensive CMOS 8K x 4-bit MCU (LSC442350DW) is used to control all the functions in the base. The MCU is clocked by a 4MHz crystal and controls such functions as DTMF generation, data communications, telephone signaling detection and ATE interfacing.

3.5.1 DTMF Generation

To minimize costs, power consumption and space, the MCU is used to generate the DTMF tones in lieu of a dedicated DTMF generator IC. The MCU generates the tone waveforms by using a 1% R-2R ladder network connected to six of its ports to produce a 6-bit D-to-A convener. The D-to-A converter's output is then passed through an active 3rd order lowpass filter to clear the waveforms of high frequency ripple caused by the digital-to-analog conversion. The -3dB cut-off for this filter is set at about 4.6kHz and has unity gain in the passband.

As mentioned in previous sections, the DTMF tones are combined in at the input of the last amplifier stage in the transmit direction for transmission onto the telephone line. The transmit audio chain is disabled at the expander during DTMF dialing to stop audio from the RF module from entering the telephone line and interfering with the dialing. As well, the DTMF tones are summed in at the compressor stage in the receive direction for audio feedback at the handset receiver.

During DTMF tone generation, the MCU's modem function are disabled to ensure that the MCU has enough resources to produce distortion free tones. If the modem functions are not disabled, the data communications associated with the modem functions in conjunction with the DTMF sample generation could overload the MCU and result in missed samples.

3.5.2 Data Communications

The data is transmitted between the handset and base at 625 baud using Minimum Shift Keying (MSK) format. The two frequencies used in the keying are 300Hz and 600Hz which represents logic 0 and logic 1 respectively. A separate modem chip is not required in the design since the MCU generates and decodes all the data. Details of the software communications protocol are not discussed in this document but are available upon request,

The level for data transmissions are set to produce about +/- 40kHz of deviation. This level was determined empirically to provide optimum data sensitivity. In the idle state, the transmit data port on the MCU is set to high impedance.

Received data from the handset is passed from the demodulator IC to the buffer amplifier where it undergoes lowpass filtering. From the buffer, the receive data is split off to the receive data chain; as mentioned in a previous section, the buffer amplifier is shared by both the audio and data, thus requiring a splitting junction at the buffer output. This receive data chain consists of lowpass filtering and a comparator to restore the data to its original condition. After conditioning, the data is coupled directly to the MCU for analysis.

3.5.3 Clock Reference

The MCU crystal frequency is 4MHz and is shared with the RF module where it is used as a reference for the phase lock loop (PLL). A trimmer capacitor is connected on one end of the crystal and is used to pull the frequency into specification. The trimmer capacitor compensates for component tolerances, crystal variations and any other parasitics that may affect the oscillating frequency. The PLL reference is tapped off the MCU's oscillator circuit via a buffer amplifier to prevent loading of the oscillator circuit.

3.5.4 Reset Circuit

The reset circuit for the MCU consists of a reset IC and supporting components. The IC is designed to reset the MCU when the power supply drops to about 4.6VDC and below. This insures that if the power supply drops to a level where logic levels may become indeterminate, the MCU will be reset to a known condition, potentially preventing erroneous operation. In addition to being connected to the reset IC, the MCU's active low reset line is connected to the power rail via an RC network. This RC network ensures that after a reset, the MCU's reset line is brought back up to a logic high cleanly and continuously.

3.5.5 EEPROM

An EEPROM (NM93C46EM8) is used to store speed dial numbers, the default channel and the security code so that they are not lost in the event of power failure.

3.5.6 ATE Interface

ATE test points are available on the base to facilitate ATE testing. The ATE uses these test points to access the signals required to complete a base alignment. Base to ATE communication is accomplished through a dedicated port on the MCU which is connected directly to a charge contact. As with other charge contacts the ATE I/O contacts are protected from ESD using LC filtering and additional protection is afforded at the MCU's port by using protection diodes.

3.5.7 LED Expansion Connector

Therefore, to facilitate changes in phone cosmetics for applications without having multiple base versions, an expansion connector which provides remote access to the LED activating circuits and the page line is provided. This connector allows other vendors to specify different LED and the page key locations on the base.

HANDSET SECTION

4.1 Introduction

This Machine is a 900MHz analog cordless telephone. The phone was developed with low cost and high performance in mind. The phone minimizes costs by using analog speech transmission and by utilizing a number of new design innovations that reduce production costs. The speech transmission differs from our digital phones in that digital speech encoding and decoding does not occur in speech transmissions. This means that elaborate software algorithms and additional hardware are avoided in the design. This Machine design features simple mechanical assembly and automated testing to date. This document describes the technical aspects and operation of this Machine handset.

All RF audio, MCU control and power management components are placed on a single PCB. The use of a single PC board reduces costs associated with ATE testing, handling and assembling.

The keypad used in this design is also a first and is printed on a separate mylar sheet that is attached to the back of the PC board with the sheet's own adhesive. Using this type of keypad prevents us from having to re-layout the PC board in the event that a different keypad arrangement is requested by one.

This Machine handset uses a three cell battery which is also a first. The smaller and lighter battery reduces costs while improving the esthetics of the handset by making it more compact. To further facilitate a smaller and lighter handset, most of the discrete components are surface mount and use formats such as those in the BP-T23.

4.2 Power Management

This Machine handset power is supplied by a three cell battery with a nominal voltage of about 3.6 VDC. This voltage is then regulated to 3 VDC and distributed throughout the handset circuits. The handset ringer is the only circuit that operates directly off the handset battery.

In order to achieve a long stand-by time, the handset conserves power by “sleeping” when not in use and occasionally “waking-up”. In the “sleep” condition, the handset supplies power only to those circuits deemed essential for proper operation such as the microcontroller (MCU) and memory. In the “wake-up” condition, in addition to the vital circuits, the handset powers the circuits that allow it to receive data. This function is necessary to detect if the base requires the handset to act on a condition such as an incoming call. With this sleep/wake-up sequence, this Machine handset is able to achieve an impressive seven day stand-by time.

4.2.1 Power Control

There are five power lines used in the handset. Four of the lines are supplied by a single 3VDC adjustable regulator and one line comes straight off the battery. The power lines give the handset the flexibility of powering down circuits that are not needed to minimize current consumption and to prevent audio signals from interfering with data and vice-versa. The MCU controls the switched power lines through transistors switches.

The five power lines are labeled MCU_PWR, RX_PWR, TX_PWR, V_ANA and V_BAT, MCU_PWR is a full-time 3VDC regulated line that is used to supply all of the handset circuits except for those in the RF module and microphone biasing. RX_PWR is a switched in 3VDC regulated line that supplies the RF circuits associated with receiving and demodulating an incoming RF signal. The TX_PWR is similar to the RX_PWR, but supplies the circuits associated with modulating and transmitting the RF signal. V_ANA is also a switched 3VDC regulated supply and is used to bias the microphone. This supply is turned on with the TX_PWR supply and is implemented to isolate noise from the RF section from the microphone circuits. And flatly, V_BAT is a direct line from the battery and thus can vary from about 3VDC to 4VDC. The V_BAT supply is used to power the ringer which requires a good voltage and current supply to operate properly. The ringer can also produce noise that can find its way onto its power supply so the V_BAT line provides some isolation from the rest of the handset’s circuits.

4.2.2 Battery Maintenance and Low Voltage Detect

The battery is recharged via a cradle contact on the base. The handset has a corresponding charge contact at the bottom of the handset chassis. The charge contact is protected from a short to ground by a diode placed in line with the battery connection. The diode prevents the battery from discharging from the charge contact. Protection from ESD is afforded by a bypass capacitors installed at the charge contact.

When the battery voltage drops below the minimum working voltage of the MCU, the phone will not function properly again if the MCU is not properly reset. Therefore, circuits have been implemented to insure that the battery has sufficient charge for proper operation.

The heart of the battery maintenance circuit and for that matter the power supply, is the adjustable regulator mentioned earlier. The regulator features an integral reference to which battery charge is compared to. If the battery voltage drops below 3.3VDC a low battery line is activated to inform the MCU. The latter action in turn causes the MCU to notify the user by activating the low battery LED and by producing an audible tone. If the battery falls below 2.8VDC, the regulator turns off the power to prevent the handset from being used while it operates improperly. A slight hysterics has been designed into the point where the low battery indicators are turned off when charging. The low battery indicators are disable when the battery voltage exceeds 3.35VDC.

4.3 Audio Path

Audio circuits are necessary to condition speech for RF transmission and reception. The conditioning includes amplification, filtering, pre-emphasis/de-emphasis and compression/expansion, all of which ensures that the speech is received and transmitted with maximum clarity and legibility.

Pre-emphasis/de-emphasis is used to improve signal-to-noise ratio which is, as a consequence of frequency or phase modulation, degraded at high audio frequencies. Compression/expansion is also used to improve the perceived signal-to-noise ratio by reducing the noise vulnerability of low level signals. The compression process amplifies low level signals more than it does for high level signals. Thus, by compressing the dynamic range of the audio before transmission, noise picked up during transmission has less of an effect on the low Level signals. Afire receiving the transmission, the expansion process maintains this improved signal-to-noise ratio while restoring the low level signals back to their original levels.

The audio circuits are implemented around a compandor IC (TA31103F). The IC provides compression/expansion, amplification and muting all in a clean, simple package. The IC is a good compromise between the parts cost, flexibility, size, and performance. Refer to the IC’s data sheets for a detailed description of its operation.

4.3.1 Receive Direction (from RF module to ear piece receiver)

The receive audio is transmitted from the base to the handset using frequency modulation (FM). The FM signal from the base enters the handset’s RF module where the signal undergoes filtering, downconversion and finally demodulation. The baseband audio then leaves the RF module via the demodulator IC at about -16dBv (for a deviation of +/- 25kHz). From the RF module, the audio is then fed into a buffer amplifier where the audio is lowpass filtered and directed to both an audio channel and a data channel. The audio undergoes this split in directions after the buffer amplifier because both data and audio share the same circuits upto and including the buffer amplifier. The filtering at the buffer amplifier provided some rejection at higher frequencies (> 40kHz).

The buffer amplifier output is connected to an active third order lowpass filter with a - 3dB cut-off set at about 5.5kHz. The filter has unity gain in its passband. The filtered audio is then passed to an active de-emphasis filter where de-emphasis occurs across the entire audio band (300Hz to 3,400kHz) at a rate of 6dB/octave or 20dB/decade. After de-emphasis, the audio undergoes the expansion process and is passed through a transmit audio level control. The level control which has a range of about 20dB, is used to set the

receive audio level at the ear piece receiver. The receive audio level can vary from component tolerances and variations. Specifically, extra adjustment range has been implemented to compensate for variations in the receiver's sensitivity.

After the level control, the audio is passed to a final stage of amplification. The output of this amplifier can be taken differentially, but is taken single ended because of the amplifier's adequate power capacity. From this amplifier, the audio is coupled to the receiver via a resistive divider. The divider is used in conjunction with a switch to set high and low levels at the receiver.

The receive audio chain can be disabled at the expander amplifier by a mute function on the compander IC. This function is used to mute the receive audio chain when data is being received from the base so that data noise is not heard at the receiver. To minimize costs, the receive audio mute function also simultaneously disables some of the transmit audio circuits. When transmitting data from the handset to the base the mute function is used to disable the transmit audio circuits.

4.3.2 Transmit Direction (from microphone to RF module)

In the transmit direction, the speech is picked up by an Electret Condenser microphone and passed into a microphone amplifier stage. The speech or transmit audio undergoes a first stage of amplification and light lowpass filtering. Following the amplifier, the transmit audio is compressed and fed directly to the pre-emphasis stage. The compressor does a straight 2 to 1 conversion, the dynamic range is reduced by one half.

From the compressor output, the transmit audio signal enters a pre-emphasis circuit with an integrated level control. The pre-emphasis like the de-emphasis is set at a rate of 6dB/octave or 20dB/decade throughout the entire audio band (300Hz to 3,400Hz). The level control, as in the receive direction, has a range of about 20dB and is used to set the level applied to the RF module. This level control thus sets the FM deviation and is necessary to compensate for component tolerances and variations in the sensitivity of the FM circuits. Extra range control has been implemented to compensate for microphone variations.

Transmit data is resistively combined in just before the level control from which point it shares the rest of the audio circuits with the receive audio. However, either only audio or only data will be present at any given time to prevent corruption of the signals. To further minimize the chance of data corruption, the transmit audio circuits are disabled at the compressor using the mute function as mentioned in the previous section. Muting this part of the transmit audio chain ensures that any noise or signals from the microphone do not interfere with data transmissions to the base.

Following the audio level control (or deviation adjust), the audio goes through another stage of amplification and light lowpass filtering before being passed to an active 3rd order lowpass filter. The filter's -3 dB cut-off is set to approximately 6.7kHz and has unity gain in the passband. The 3rd order lowpass filter's output is then coupled to the RF module's frequency modulator.

4.4 MCU Circuits

A relatively inexpensive CMOS 8K x 4-bit MCU (LSC442349DW) is used to control all the functions in the handset. The MCU is clocked by a 4MHz crystal and controls such functions as data communications, sleep/wake-up control, battery maintenance and ATE interfacing.

4.4.1 Data Communications

The data is transmitted between the handset and base at 625 baud using Minimum Shift Keying (MSK) format. The two frequencies used in the keying are 300Hz and 600Hz which represents logic 0 and logic 1 respectively. A separate modem chip is not required in the design since the MCU generates and decodes all the data. Details of the software communications protocol are not discussed in this document but are available upon request.

The level for data transmissions are set to produce about +/- 40kHZ of deviation. This level was determined empirically to provide optimum data sensitivity. In the idle state, the transmit data port on the MCU is set to high impedance.

Received data from the base is passed from the demodulator IC to the buffer amplifier where it undergoes lowpass filtering. From the buffer, the received data is split off to the receive data chain; as mentioned in a previous section, the buffer amplifier is shared by both the audio and data, thus requiring a splitting junction at the buffer output. This receive data chain consists of lowpass filtering and a comparator to restore the data to its original condition. After conditioning, the data is coupled directly to the MCU for analysis.

4.4.2 Clock Reference

The MCU crystal frequency is 4MHz and is shared with the RF module where it is used as a reference for the phase lock loop (PLL). A trimmer capacitor is connected on one end of the crystal and is used to pull the frequency into specification. The trimmer capacitor compensates for component tolerances, crystal variations and any other parasitics that may affect the oscillating frequency. The PLL reference is tapped off the MCU's oscillator circuit via a buffer amplifier to prevent loading of the oscillator circuit.

4.4.3 Keypad Control

The keypad is arranged as a 4 x 5 (row x column) matrix with each row pulled up to MCU_PWR by a pull up resistor. When the MCU is ready to accept a key press, columns COL0 to COL3 are set low. As soon as a key is depressed, the MCU will detect this by sampling the rows (i.e., a row will be pulled low). To determine what column was connected to the row, identifying what key was pressed, the MCU sets all columns high and then sequentially sets them low until the previous detected row is pulled low. During the sleep mode, only Phone, Channel, OFF and PGM keys will wake up the MCU via the IRQ line. The MCU Will not response to other keys in sleep mode since it is not scanning.

4.4.4 ATE Interface

All connections to the ATE jig are facilitated by a single 10-pin header rather than a bed of nail which has been shown to have reliability problems. The ATE uses the header to access the signals required to complete a handset alignment. Handset to ATE communication is accomplished through a dedicated port on the MCU which is connected directly to a charge contact. As with other charge contacts the ATE I/O contacts are protected from ESD using LC filtering and additional protection is afforded at the MCU's port by using protection diodes.

4.4.5 Ringer

The ringer used in the handset is basically a magnetic transducer. It takes an electrical signal from the MCU and uses it to create a varying magnetic field to vibrate a metal diaphragm. The vibrating diaphragm in turn produces acoustic waves forming sound energy. The ringer draws a large amount of current when it rings and is therefore powered directly from the battery. There are four different ring signals produced by the MCU to provide four distinct ringing tones. Each signal is a combination of two frequencies. The frequencies are listed in Table 4.4.5.

Table 4.4.5 MCU Ringer Tone Frequencies

RING TONE NUMBER	FREQUENCY #1 (Hz)	FREQUENCY #2 (Hz)
l	2,500	1,250
2	2,500	625
3	1,250	625
4		312

The MCU's ringing tones are coupled to the ringer via transistors. These transistors are biased to insure that ringer output is consistent from handset to handset.

4.4.6 Sleep Timer

The sleep timer wakes up the handset from sleep mode by pulling the IRQ line on the MCU low. The sleep timer circuit is made up of a compactor, an RC network and supporting components. The circuit acts basically like a one-shot activated by the RX_PWR line. With the MCU asleep, the receive power is off allowing an RC network to charge up. The charge on the capacitor is compared to a set reference and at a certain point toggles the comparator output low. The low pulls the IRQ low waking up the MCU.

When the MCU a wakes, it executes its interrupt routine to check for base data. To do this, the MCU powers the RX_PWR line which in turn resets the IRQ line high. As soon as the MCU completes its interrupt routine, the handset goes back to sleep if no base data was detected and the sequence is repeated.

4.4.7 LED Indicators

The handset features two LED indicators. One indicator is used to show that the handset is in use while the other indicates a low battery condition. The low battery indicator is turned off and on by the MCU until either the battery reaches a charged state (> 3.35 VDC), or the handset is shut done do to insufficient battery charge (< 2.8VDC).

SECTION 4
ADJUSTMENTS

4-1. BASE UNIT SECTION

• Perform the adjustment at 6CH (RX : 926.55MHz, TX : 903.8MHz) by removing R1 as a rule.

1. RX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 926.55MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX LOOP V (ATE terminal).
3. Adjust the C88 for 2.0V ± 0.2V reading on the digital voltmeter.

2. TX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the digital voltmeter to TX LOOP V (ATE terminal).
2. Adjust the C49 for 2.0V ± 0.2V reading on the digital voltmeter.

3. QUAD-TUNE VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX AUDIO (ATE terminal).
3. Adjust the C87 for 2.2V ± 0.1V reading on the digital voltmeter.

4. 4.0MHz CLOCK REFERENCE Adjustment

Procedure :

1. Connect the frequency counter to IC3 (㉖ pin).
2. Adjust the C92 for 4.0MHz ± 500Hz reading on the frequency counter.

5. DEMODULATION LEVEL Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the modulation meter to IC6 (⑱ pin).
3. Adjust the R114 for 21dBV ± 1dB reading on the modulation meter.

6. TX DEVIATION Adjustment

Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Adjust the R135 for DEVIATION = 25kHz ± 1.0kHz reading on the modulation meter.

7. TX power and TX frequency Confirmation

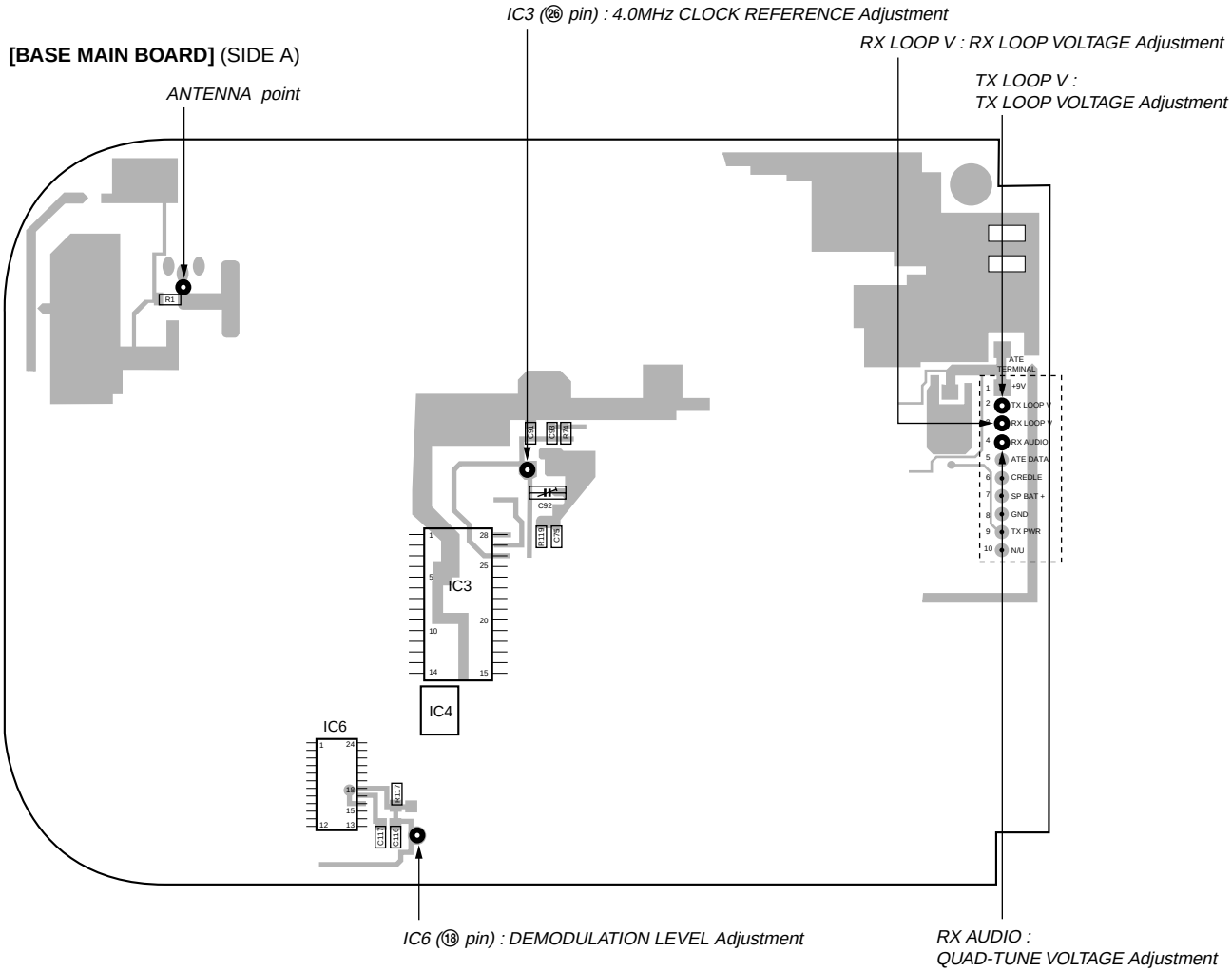
Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Confirm the TX power is – 5 dBm ± 2dB.
   Confirm the TX frequency is 903.8MHz ± 1kHz.

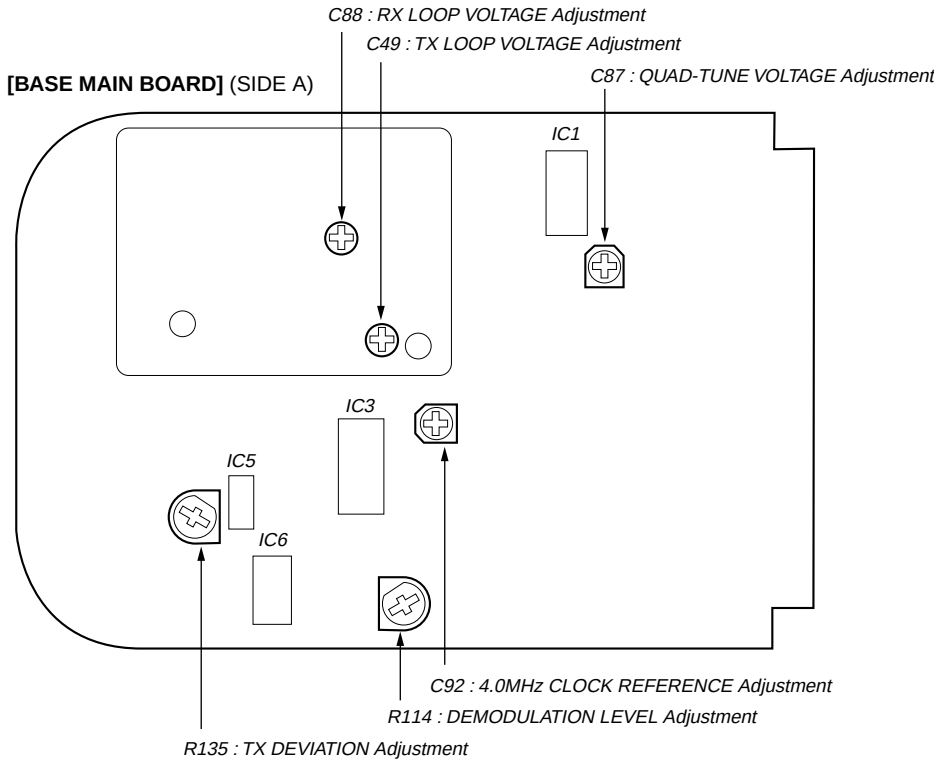
Connet and Adjustment Location : BASE MAIN board

(see page 24)

Connect Location :



Adjustment Location :



4-2. HANDSET SECTION

• Perform the adjustment at 6CH (RX : 903.8MHz, TX : 926.55MHz) by removing R1 as a rule.

1. RX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX LOOP V (ATE terminal).
3. Adjust the C88 for 1.2V ± 0.2V reading on the digital voltmeter.

2. TX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the digital voltmeter to TX LOOP V (ATE terminal).
2. Adjust the C49 for 1.2V ± 0.2V reading on the digital voltmeter.

3. QUAD-TUNE VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX AUDIO (ATE terminal)
3. Adjust the C87 for 1.2V ± 0.1V reading on the digital voltmeter.

4. 4.0MHz CLOCK REFERRENCE Adjustment

Procedure :

1. Connect the frequency counter to IC3 (㉖ pin).
2. Adjust the C92 for 4.0MHz ± 500Hz reading on the frequency counter.

5. DEMODULATION LEVEL Adjustment

• Remove the speaker from SP1 (RECEIVER).

• Set VOLUME switch (S19) in “normally”.

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the modulation meter to RECEIVER + (ATE terminal)
3. Adjust the R113 for – 19dBV ± 1dB reading on the modulation meter.

6. TX DEVIATION Adjustment

Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Adjust the R119 for TX DEVIATION= 25kHz ± 2kHz reading on the modulation meter.

7. TX power and TX frequency Confirmation

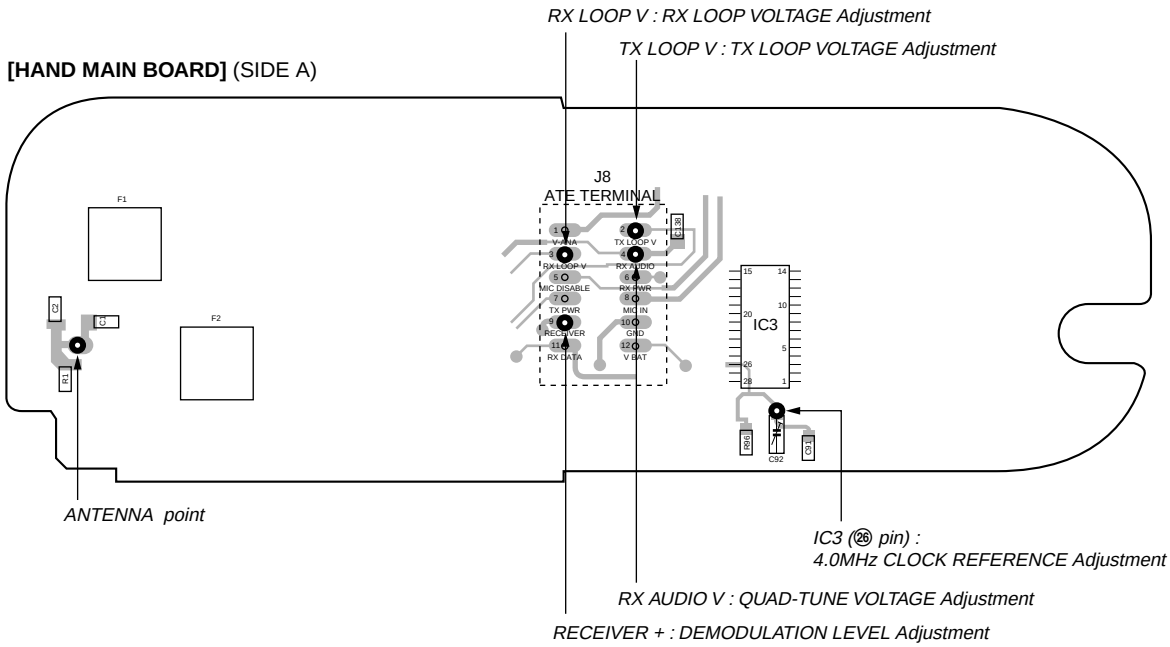
Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Confirm the TX power is – 5 dBm ±2dB.
   Confirm the TX frequency is 926.55MHz ±1kHz.

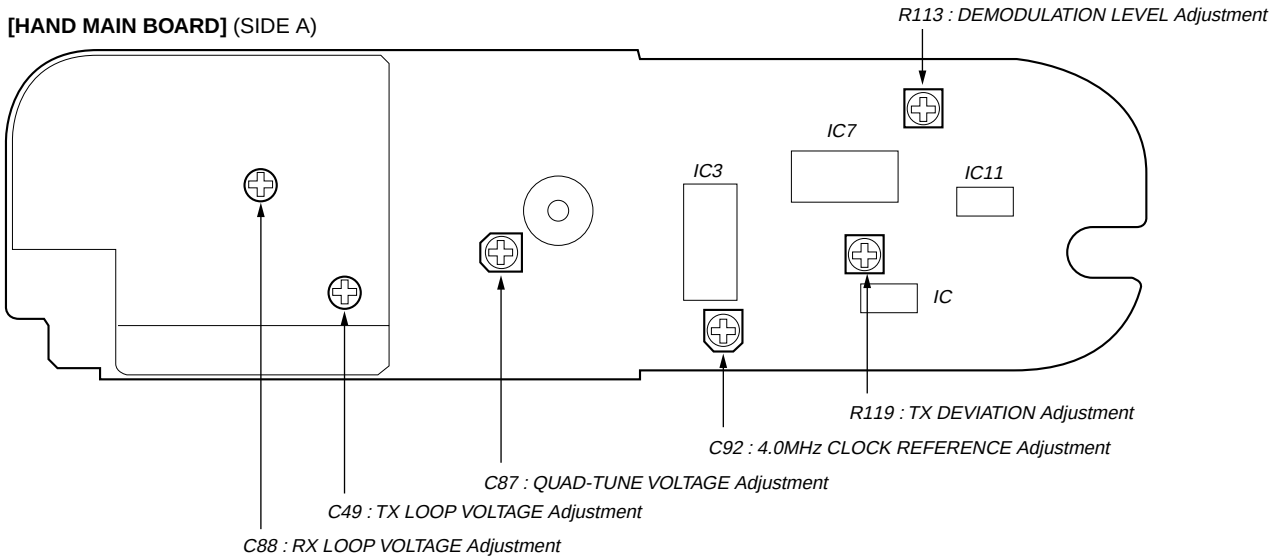
Connect and Adjustments Location : HAND MAIN board

(see page 26)

Connect Location :


RX LOOP V : RX LOOP VOLTAGE Adjustment
TX LOOP V : TX LOOP VOLTAGE Adjustment
[HAND MAIN BOARD] (SIDE A)
J8
ATE TERMINAL
IC3
ANTENNA point
IC3 (26 pin) :
4.0MHz CLOCK REFERENCE Adjustment
RX AUDIO V : QUAD-TUNE VOLTAGE Adjustment
RECEIVER + : DEMODULATION LEVEL Adjustment

Adjustment Location :



SECTION 5
DIAGRAMS

5-1. EXPLANATION OF IC TERMINALS

BASE UNIT SECTION
IC3 LCD442350DW

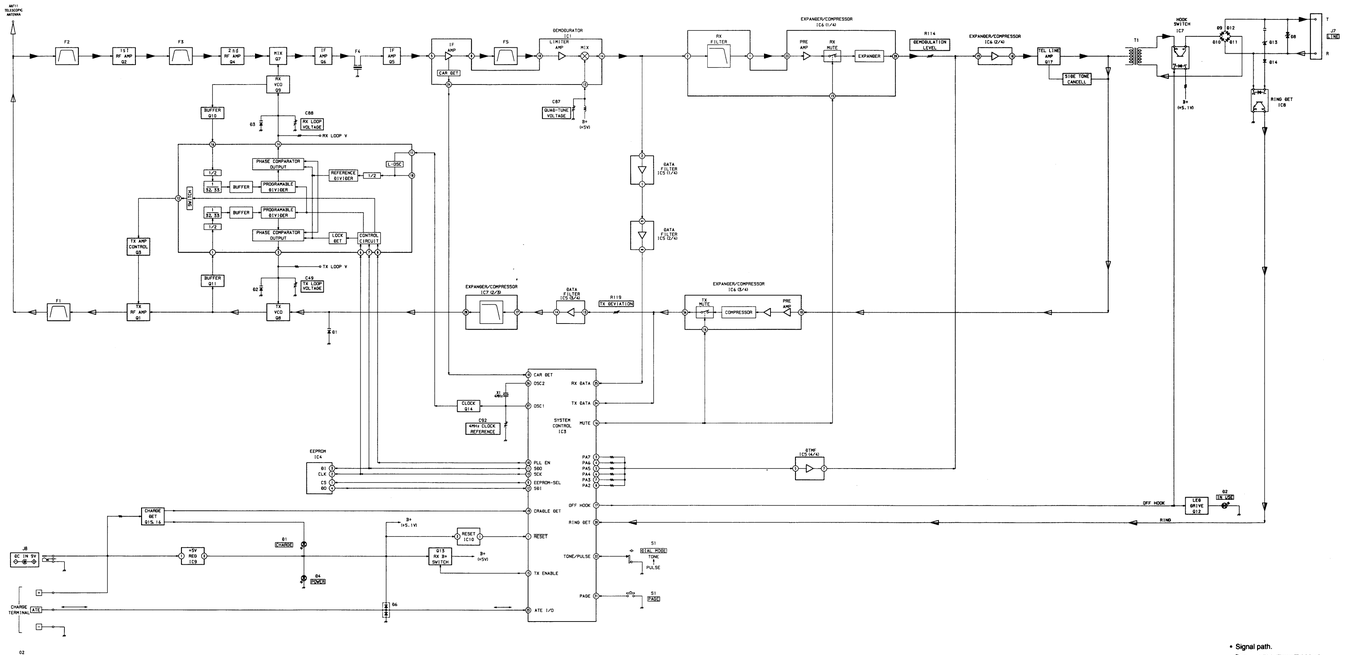
Pin No.	Pin name	I/O	Description
1	$\overline{\text{RESET}}$	I	Reset terminal.
2	IRQ	I	External interrupt terminal.
3	PA7	O	Used for DTMF generation.
4	PA6	O	Used for DTMF generation.
5	PA5	O	Used for DTMF generation.
6	PA4	O	Used for DTMF generation.
7	PA3	O	Used for DTMF generation.
8	PA2	O	Used for DTMF generation.
9	EEPROM–SEL	O	Chip select for EEPROM.
10	PLL EN	O	Chip select for PLL.
11	SDO	O	Serial data output.
12	SDI	I	Serial data input.
13	SCK	O	Serial clock.
14	Vss	–	Power supply terminal (Ground).
15	TX ENABLE	O	TX circuit enable terminal.
16	MUTE	O	TX/RX mute terminal.
17	OFF HOOK	O	Telephone line ON/OFF control.
18	CAR DET	I	Carrier frequency detect terminal.
19	CRADLE DET	I	On cradle detection terminal.
20	RING DET1	I	Ring detect terminal.
21	PAGE	I	Page key input terminal.
22	TPONE/PULSE	I	Dial mode switch input (H : Pulse, L : Tone).
23	ATE IO	I/O	For automatic testing equipment.
24	TX DATA	O	TX data output terminal.
25	RX DATA	I	RX data input terminal.
26	OSC2	O	System clock oscillator (4kHz).
27	OSC1	I	System clock oscillator (4kHz).
28	Vdd	–	Power supply terminal (+5V).

HANDSET UNIT SECTION
IC3 LCD442349DW

Pin No.	Pin name	I/O	Description
1	$\overline{\text{RESET}}$	I	Reset terminal.
2	IRQ	I	External interrupt terminal.
3	COL3	O	Key matrix scan output terminal.
4	COL2	O	Key matrix scan output terminal.
5	COL1	O	Key matrix scan output terminal.
6	COL0	O	Key matrix scan output terminal.
7	ROW4	I	Key matrix scan input terminal.
8	ROW3	I	Key matrix scan input terminal.
9	ROW2	I	Key matrix scan input terminal.
10	ROW1	I	Key matrix scan input terminal.
11	PLL DATA	O	Data output for PLL.
12	PLL EN	O	PLL enable.
13	PLL CLK	O	Serial clock for PLL.
14	V_{SS}	–	Power supply terminal (Ground).
15	TX ENABLE	O	TX circuit enable terminal.
16	RX ENABLE	O	RX circuit enable terminal.
17	LED CONT1	O	TALK LED drive.
18	LED CONT2	O	BATTLOW LED drive.
19	MUTE	O	TX/RX mute terminal.
20	RING	O	Ringer signal output.
21	ATE IO	I/O	For automatic testing equipment.
22	LO BATT	I	Low battery detection terminal.
23	CRADLE DET	I	On cradle detection terminal.
24	TX DATA	O	TX data output terminal.
25	RX DATA	I	RX data input terminal.
26	OSC2	O	System clock oscillator (4kHz).
27	OSC1	I	System clock oscillator (4kHz).
28	Vdd	–	Power supply terminal (+3V).

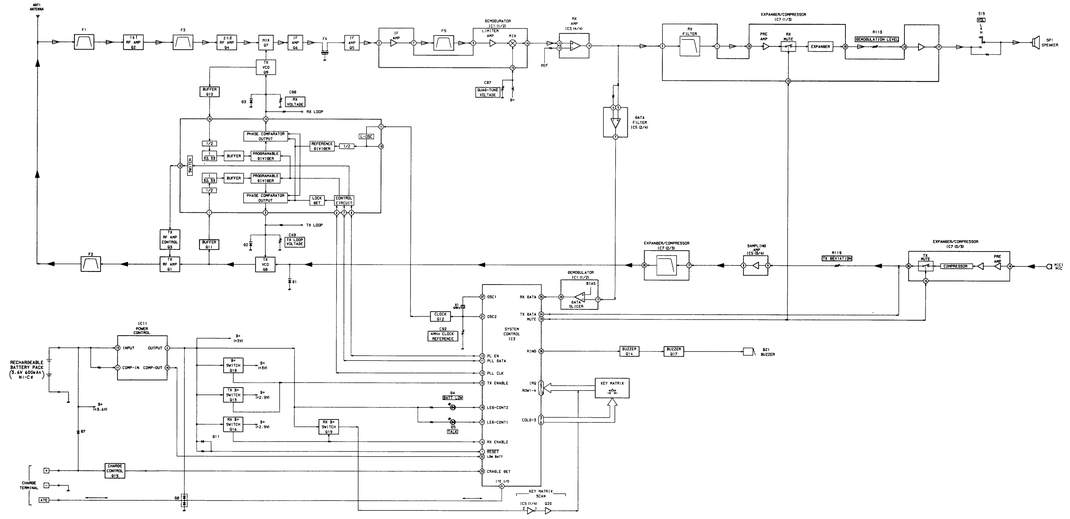
5-2. BLOCK DIAGRAMS

(BASE UNIT SECTION)



• Signal path.
▷ : RX (From Tel Line)
▶ : TX (To Tel Line)
▶ : RING

(HANDSET SECTION)



• Signal path.
▷ : RX (From Tel Line)
▶ : TX (To Tel Line)

5-3. PRINTED WIRING BOARDS (BASE UNIT SECTION)

SEE ADDITIONAL INFORMATION

● SEMICONDUCTOR LOCATION

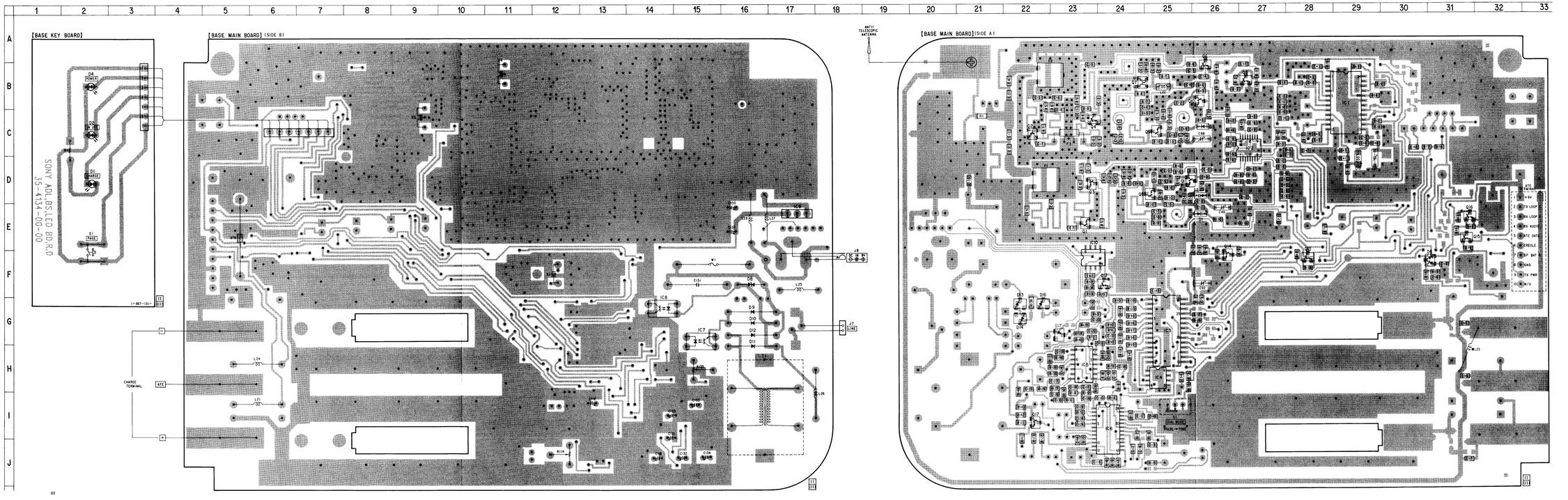
Ref. No.	Location	Ref. No.	Location
D1 (BASE KEY BOARD)	D-2	IC3	G-25
		IC4	H-24
		IC5	H-23
D1 (BASE MAIN BOARD)	E-25		
		IC6	I-23
		IC7	G-15
D2 (BASE KEY BOARD)	C-2	IC8	G-14
		IC9	E-17
		IC10	F-23
D2 (BASE MAIN BOARD)	D-25		
		Q1	E-23
D3	C-26	Q2	C-22
		Q3	D-23
D4	B-2	Q4	C-23
D6	F-30	Q5	B-26
D8	F-16		
D9	G-16	Q6	B-26
D10	G-16	Q7	B-24
		Q8	D-24
D11	G-16	Q9	C-24
D12	G-16	Q10	B-25
D13	G-22		
D14	G-22	Q11	D-25
D16	G-22	Q12	F-23
		Q13	F-28
D17	G-22	Q14	F-26
		Q15	E-31
IC1	B-28	Q16	E-31
IC2	C-26	Q17	I-22

Note:

- ○— : parts extracted from the component side.
- ● : Through hole.
- ▒▒ : Pattern from the side which enables seeing. (The other layers' patterns are not indicated)

Caution :

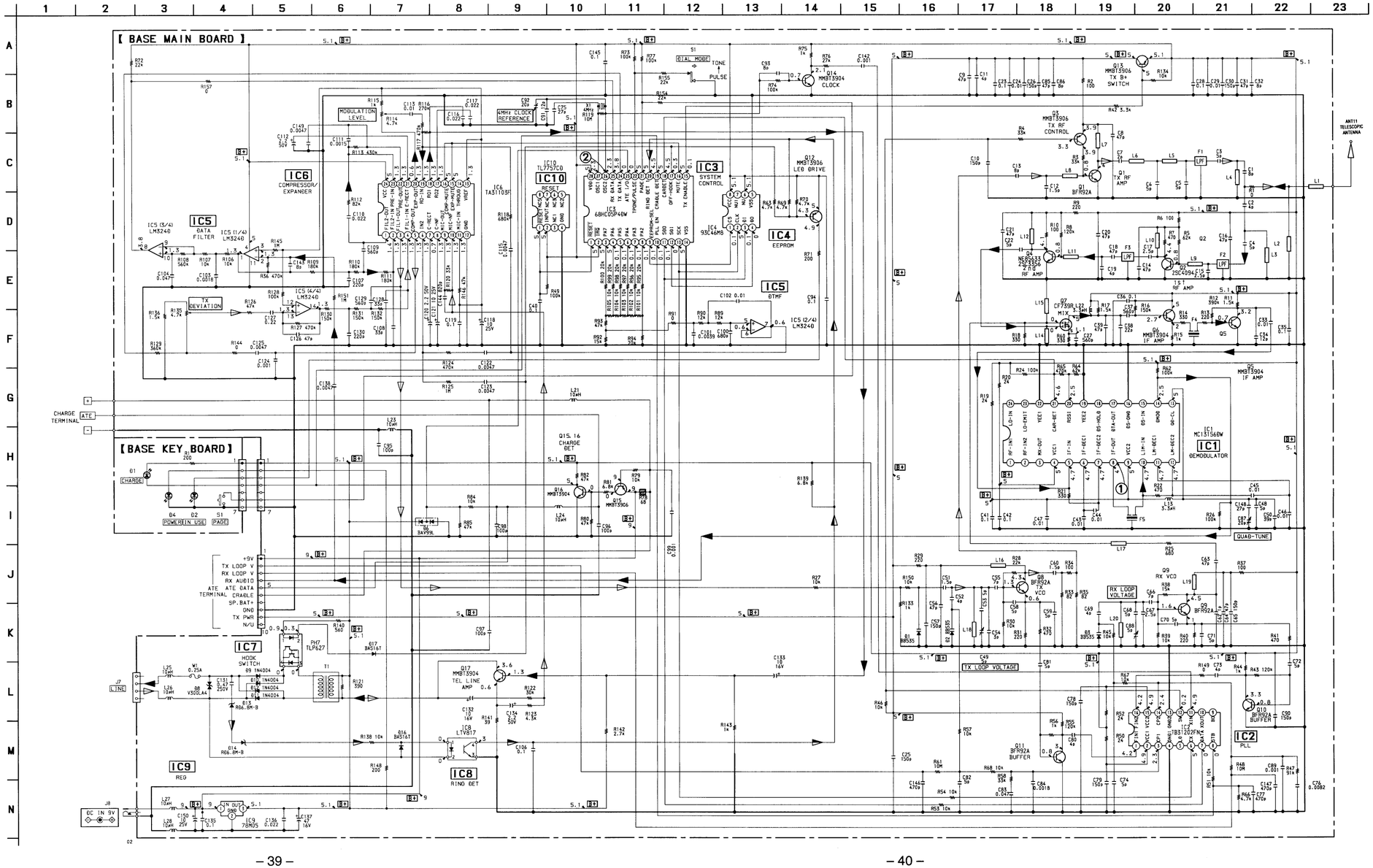
Pattern face side : Parts on the pattern face side seen from (Conductor Side) the pattern face are indicated.
Parts face side : Parts on the parts face side seen from the (Component side) parts face are indicated.



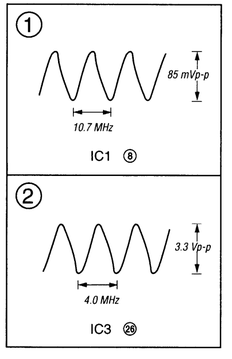
5-4. SCHEMATIC DIAGRAM (BASE UNIT SECTION)

● Refer to page 48 for IC Block Diagrams.

SEE ADDITIONAL INFORMATION



● WAVEFORMS



Note :

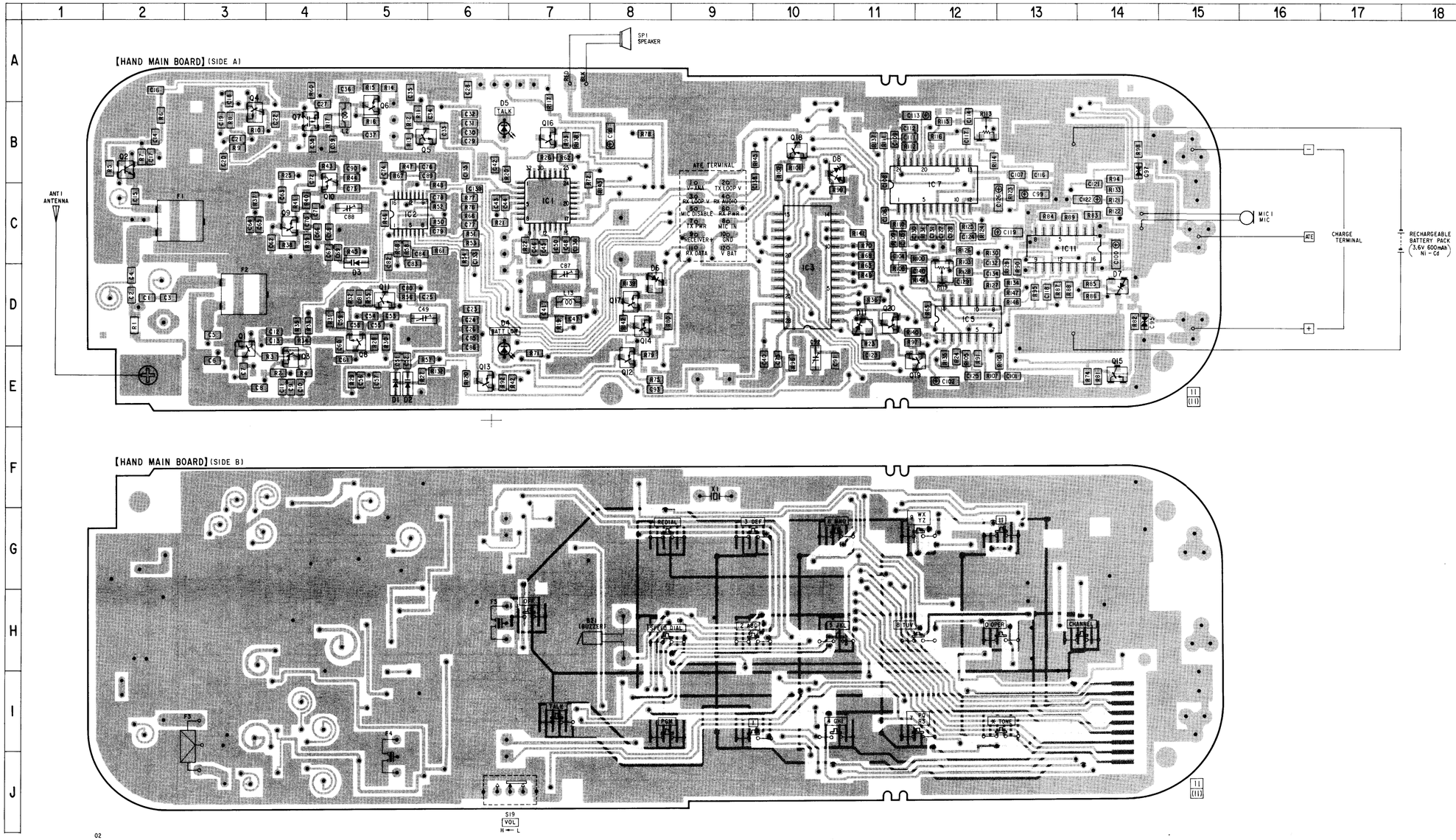
- All capacitors are in µF unless otherwise noted. pF: µµF
  50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4 W or less unless otherwise specified.
- B+ : B+ Line
- Power voltage is dc 9V and fed with regulated dc power supply from external power voltage jack (J8).
- Voltage and waveforms are dc with respect to ground under no-signal conditions.
- Voltages are taken with a VOM (Input impedance 10MΩ). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- : Printed inductor.
- Signal path.
  : RX (From Tel Line)
  : TX (To Tel Line)
  : RING

5-5. PRINTED WIRING BOARDS (HANDSET SECTION)

SEE ADDITIONAL INFORMATION

• SEMICONDUCTOR LOCATION

Ref. No.	Location	Ref. No.	Location
D1	E-5	Q2	B-2
D2	E-5	Q3	E-4
D3	D-5	Q4	B-3
D4	D-6	Q5	B-5
D5	B-6		
		Q6	B-5
D6	D-8	Q7	B-4
D7	D-14	Q8	D-5
D8	B-11	Q9	C-4
D11	D-11	Q10	C-4
		Q11	D-5
IC1	C-7	Q12	E-8
IC2	C-5	Q13	E-6
IC3	D-10	Q14	D-8
IC5	D-12	Q15	E-14
IC7	B-12		
		Q16	B-7
IC11	C-13	Q17	D-8
		Q18	B-10
		Q19	E-12
Q1	D-3	Q20	D-11



Note:

- ○— : parts extracted from the component side.
- Pattern of the rear side
- □ : Chip components extracted from the rear side.
- ● : Through hole.
- : Pattern from the side which enables seeing. (The other layers' patterns are not indicated)

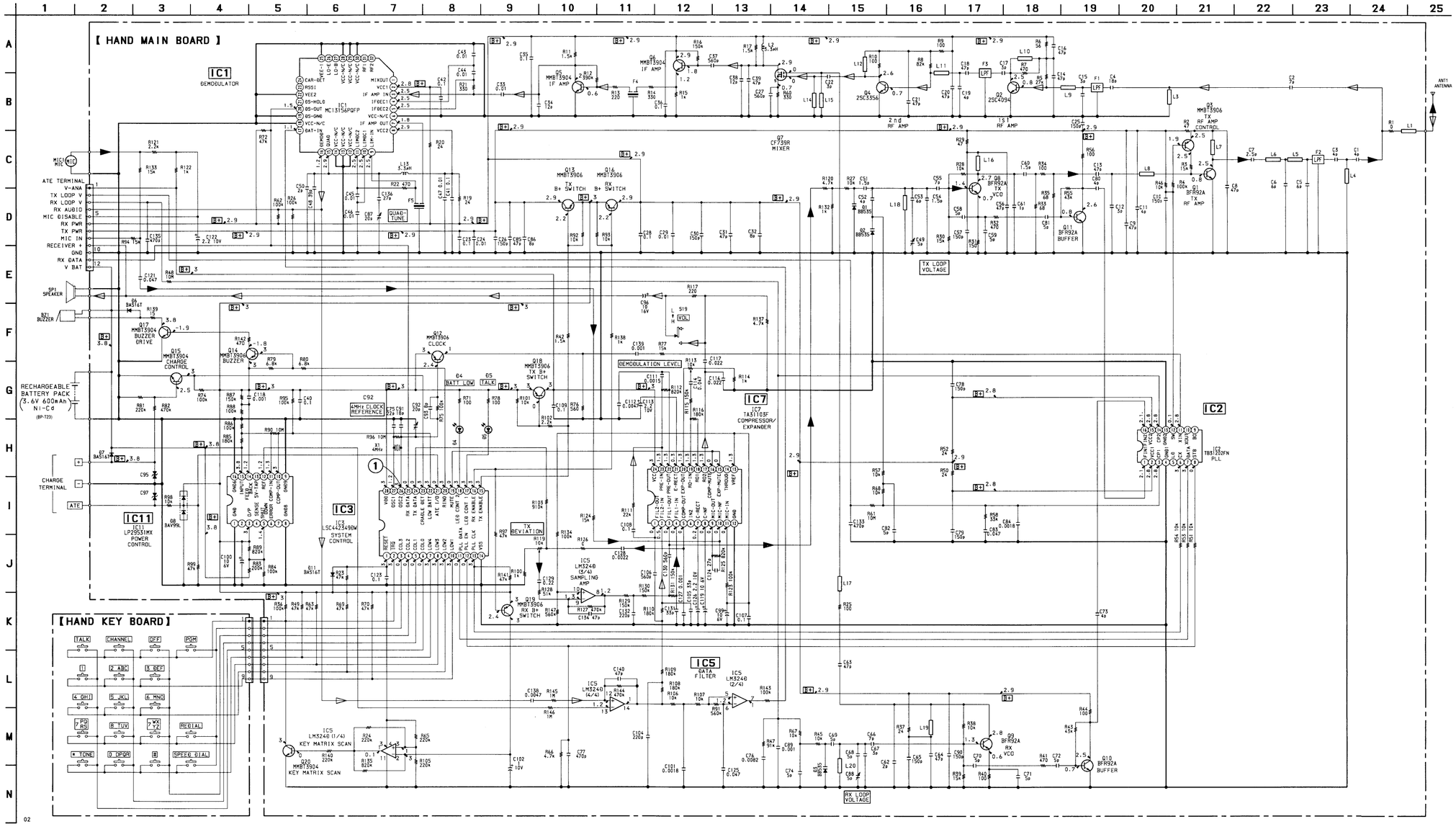
Caution :

Pattern face side : (Conductor Side) Parts on the pattern face side seen from the pattern face are indicated.
Parts face side : (Component side) Parts on the parts face side seen from the parts face are indicated.

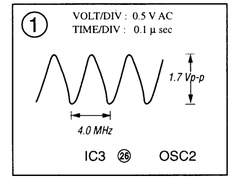
5-6. SCHEMATIC DIAGRAM (HANDSET SECTION)

● Refer to page 48 for IC Block Diagrams.

SEE ADDITIONAL INFORMATION



● WAVEFORMS

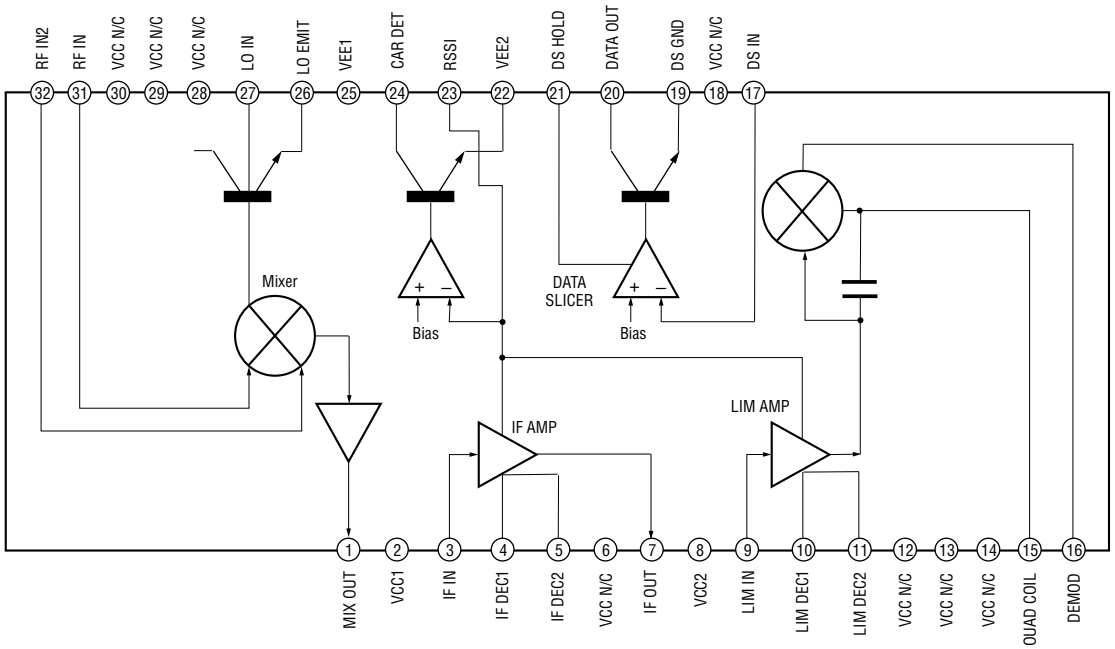


Note :

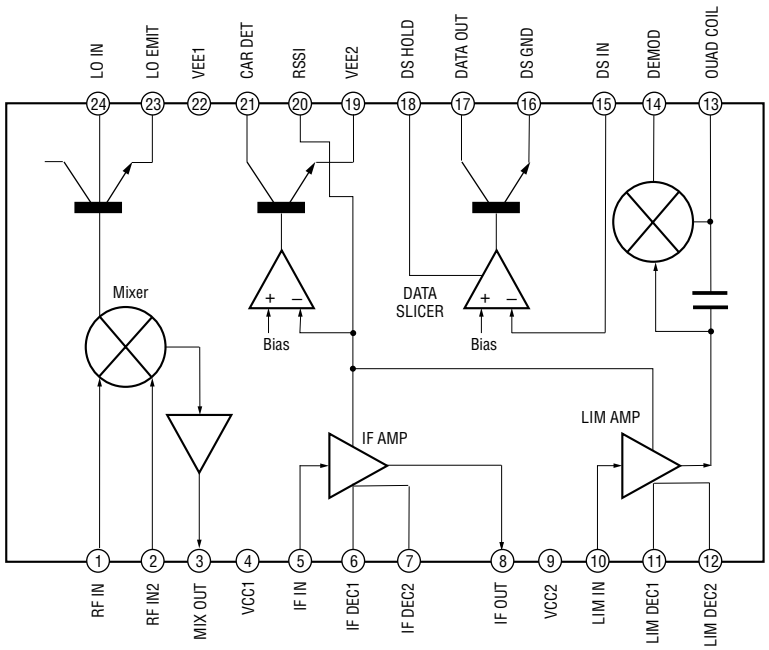
- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4 W or less unless otherwise specified.
- % : indicates tolerance.
- Δ : internal component.
- B+ : B+ Line
- ▭ : adjustment for repair.
- Power voltage is dc 3.6V and fed with regulated dc power supply from battery terminal.
- Voltage and waveforms are dc with respect to ground under no-signal conditions.
  no mark : TALK
- Voltages are taken with a VOM (Input impedance 10MΩ). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- ▭▭ : Printed inductor.
- Signal path.
  ▷ : RX (From Tel Line)
  ▶ : TX (To Tel Line)

● **IC BLOCK DIAGRAMS**

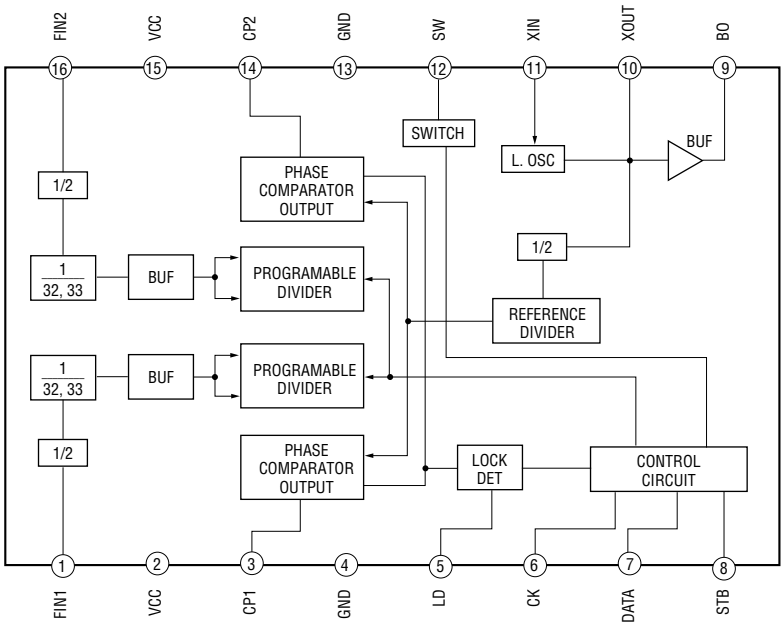
IC1 MC13156FB (HANDSET SECTION)



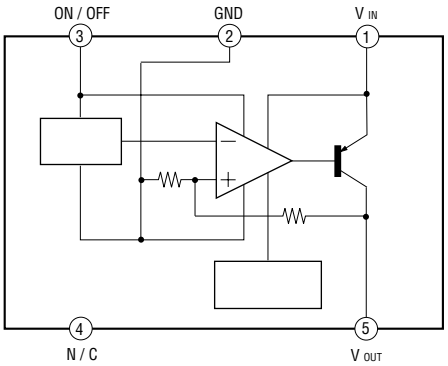
IC1 MC13156DWR2 (BASE UNIT SECTION)



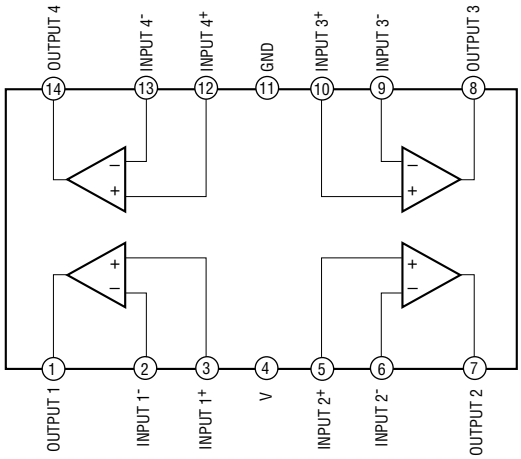
IC2 TB31202FN (BASE UNIT SECTION)
IC2 TB31202FN (HANDSET SECTION)



IC11 LP2953IM (HANDSET SECTION)



IC5 BA10324AF (BASE UNIT SECTION)
IC5 BA10324AF (HANDSET SECTION)

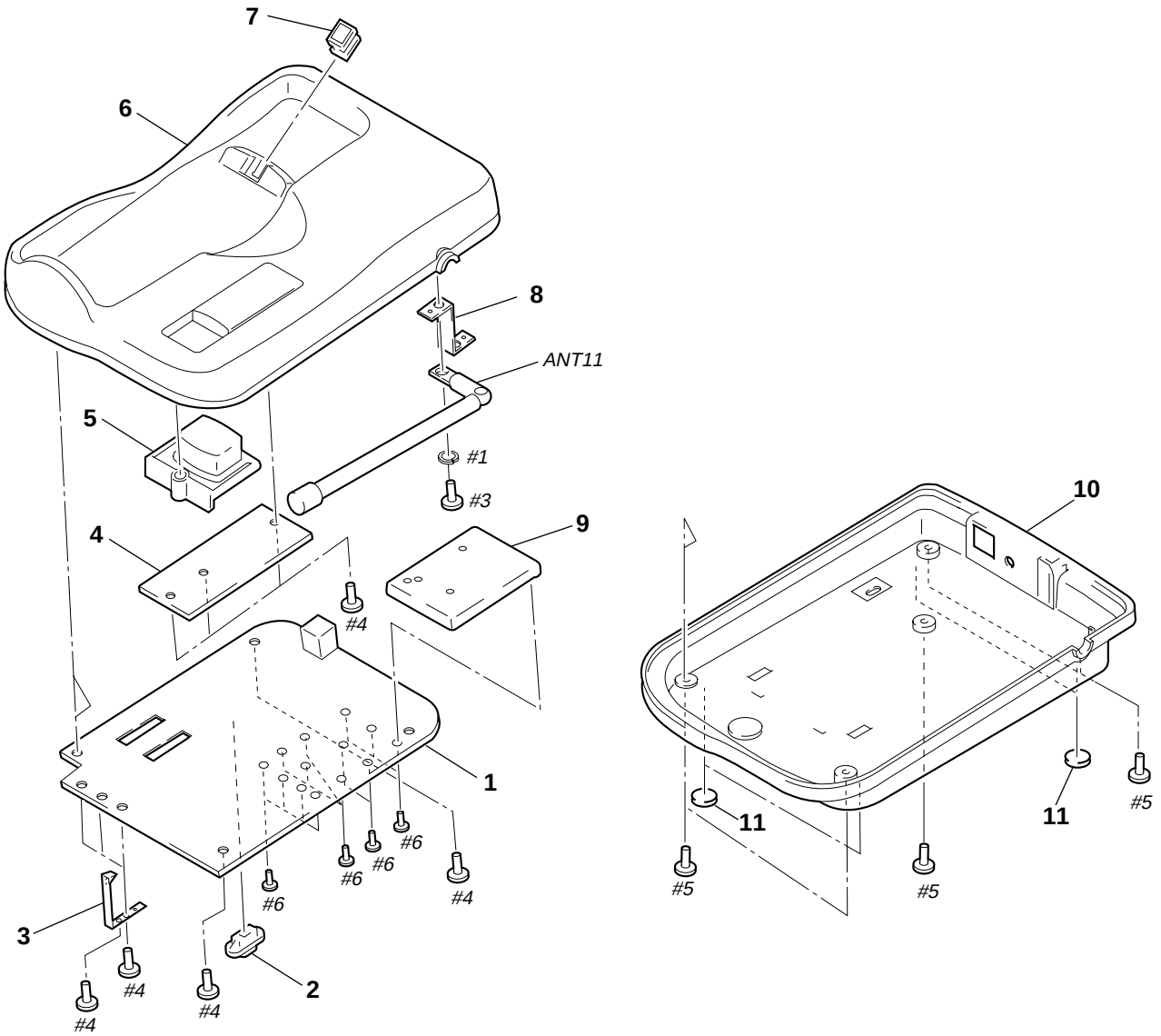


SECTION 6
EXPLODED VIEWS

NOTE :

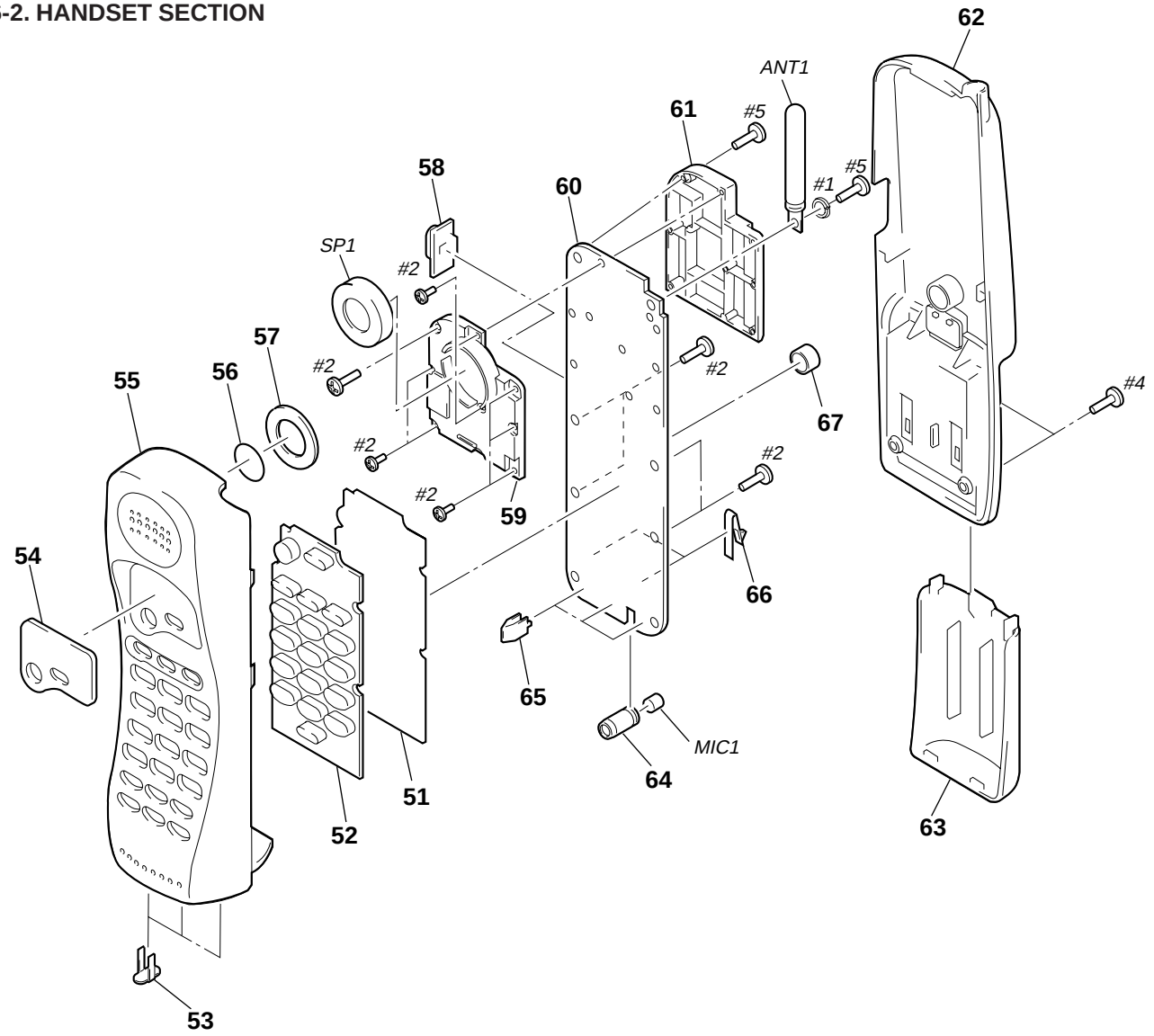
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of this parts list.

6-1. BASE UNIT SECTION



Ref. No.	Part No.	Description	Remark
* 1	A-3672-307-A	BASE MAIN BOARD, COMPLETE	
2	3-017-310-01	KNOB (SLIDE)	
3	3-017-311-01	TERMINAL (CHARGE BASE)	
* 4	1-667-131-11	BASE KEY BOARD	
5	3-017-307-01	BUTTON (PAGE)	
6	3-017-309-01	CABINET (UPPER), BASE (including LENS (LED))	
7	3-011-485-01	HOOK	
8	3-011-409-11	CONTACT (ANT)	
* 9	3-011-466-01	CASE (BASE), SHIELD	
10	3-017-306-01	CABINET (LOWER), BASE (US,Canadian)	
10	3-017-306-11	CABINET (LOWER), BASE (E)	
11	3-383-270-01	FOOT, RUBBER	
ANT11	1-501-904-11	TELESCOPIC ANTENNA	

6-2. HANDSET SECTION



Ref. No.	Part No.	Description	Remark
51	1-771-178-11	SWITCH, SHEET	
52	1-771-177-11	SWITCH, RUBBER KEY	
53	3-016-287-01	TERMINAL, CHARGE	
54	3-016-283-01	PANEL	
55	3-016-280-01	CABINET (FRONT), HAND	
56	3-012-611-01	SHEET (RECEIVER)	
57	3-372-738-01	GASKET (RECEIVER) (TWN)	
58	3-016-284-01	KNOB (VOL)	
* 59	3-016-289-01	CASE (FRONT), SHIELD	
* 60	A-3672-305-A	HAND MAIN BOARD, COMPLETE	
* 61	3-012-337-01	CASE (REAR), SHIELD	

Ref. No.	Part No.	Description	Remark
62	3-016-281-01	CABINET (REAR), HAND (US,Canadian)	
62	3-016-281-11	CABINET (REAR), HAND (E)	
63	3-016-279-01	LID, BATTERY CASE	
64	3-016-288-01	HOLDER (MIC)	
65	3-016-290-01	TERMINAL (CHARGE HAND)	
66	3-016-291-01	TERMINAL (CHARGE HAND)	
67	3-016-285-01	HOLDER (BUZZER)	
ANT1	1-501-951-11	ANTENNA	
MIC1	1-542-260-31	MICROPHONE, ELECTRET CONDENSER	
SP1	1-505-593-11	SPEAKER (2.8cm)	

BASE KEY **BASE MAIN**

SECTION 7
ELECTRICAL PARTS LIST

NOTE :
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE :Metal oxide-film resistor
  F : nonflammable
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u : µ , for example :
  uA.... : µ A.... , uPA.... : µ PA....
  uPB.... : µ PB.... , uPC.... : µ PC....
  uPD.... : µ PD....
- CAPACITORS
  uF : µ F
- COILS
  uH : µ H

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
*	1-667-131-11	BASE KEY BOARD			
		**********			
		< DIODE >			
D1	8-719-031-09	LED SLB-25MR3F (CHARGE)			
D2	8-719-031-00	LED SLB-25MG3F (IN USE)			
D4	8-719-031-00	LED SLB-25MG3F (POWER)			
		< RESISTOR >			
R1	1-247-814-11	CARBON	200	5%	1/4W
		< SWITCH >			
S1	1-554-937-11	SWITCH, KEY BOARD (PAGE)			
**********					
*	A-3672-307-A	BASE MAIN BOARD, COMPLETE			
		**********			
*	3-011-466-01	CASE (BASE), SHIELD			
	3-017-310-01	KNOB (SLIDE)			
	3-017-311-01	TERMINAL (CHARGE BASE)			
	7-685-104-19	SCREW +BTP 2X6 TYPE2			
		< CAPACITOR >			
C1	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C2	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C3	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C4	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C5	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C6	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C7	1-162-907-11	CERAMIC CHIP	2PF	0.25PF	50V
C8	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C9	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C10	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C11	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C12	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C13	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C14	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C15	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C16	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C17	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C18	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C19	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C20	1-162-923-11	CERAMIC CHIP	47PF	5%	50V

Ref. No.	Part No.	Description			Remark
C21	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C22	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C23	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C24	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C25	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C26	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C27	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C28	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C29	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C30	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C31	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C32	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C33	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C34	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C35	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C36	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C37	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C38	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C39	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C40	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C41	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C42	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C43	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C44	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C45	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C46	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C47	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C48	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C50	1-162-922-11	CERAMIC CHIP	39PF	5%	50V
C51	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C52	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C53	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C54	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C55	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C56	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C57	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C58	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C59	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C60	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C62	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C63	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C64	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C65	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C66	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V

Ref. No.	Part No.	Description			Remark
C67	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C68	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C69	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C70	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C71	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C72	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C73	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C74	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C75	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C76	1-164-174-11	CERAMIC CHIP	0.0082uF	10%	25V
C77	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C78	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C79	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C80	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C81	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C82	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C83	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C84	1-162-977-11	CERAMIC CHIP	0.0018uF	10%	50V
C85	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C86	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C89	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C90	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C91	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C93	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C94	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C95	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C96	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C97	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C98	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C99	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C100	1-162-963-11	CERAMIC CHIP	680PF	10%	50V
C101	1-164-173-11	CERAMIC CHIP	0.0039uF	10%	50V
C102	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C103	1-162-977-11	CERAMIC CHIP	0.0018uF	10%	50V
C104	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C106	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C107	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C108	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C109	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C110	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C111	1-162-965-11	CERAMIC CHIP	0.0015uF	10%	50V
C112	1-115-872-11	ELECT	2.2uF	20%	50V
C113	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C115	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C116	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C117	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C118	1-126-096-11	ELECT	10uF	20%	35V
C119	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C120	1-115-872-11	ELECT	2.2uF	20%	50V
C121	1-126-096-11	ELECT	10uF	20%	35V
C122	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C123	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C124	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C125	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C126	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C127	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C128	1-162-921-11	CERAMIC CHIP	33PF	5%	50V

Ref. No.	Part No.	Description			Remark
C129	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C130	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C131	1-136-193-11	FILM	0.47uF	5%	250V
C132	1-126-791-11	ELECT	10uF	20%	16V
C133	1-126-791-11	ELECT	10uF	20%	16V
C134	1-115-872-11	ELECT	2.2uF	20%	50V
C135	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C136	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C137	1-126-967-11	ELECT	47uF	20%	16V
C138	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C142	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C143	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C144	1-164-473-11	CERAMIC CHIP	820PF	10%	50V
C145	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C146	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C147	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C148	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C149	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C150	1-126-096-11	ELECT	10uF	20%	35V
		< TRIMMER >			
C49	1-141-372-11	CAP, TRIMMER	5PF		
C87	1-141-374-11	CAP, TRIMMER	20PF		
C88	1-141-372-11	CAP, TRIMMER	5PF		
C92	1-141-374-11	CAP, TRIMMER	20PF		
		< DIODE >			
D1	8-719-033-90	DIODE 1SV229-TPH3			
D2	8-719-033-90	DIODE 1SV229-TPH3			
D3	8-719-033-90	DIODE 1SV229-TPH3			
D6	8-719-909-90	DIODE BAV99			
D8	1-801-730-11	VARISTOR			
D9	8-719-911-55	DIODE U05G			
D10	8-719-911-55	DIODE U05G			
D11	8-719-911-55	DIODE U05G			
D12	8-719-911-55	DIODE U05G			
D13	8-719-157-36	DIODE RD6.8M-B			
D14	8-719-157-36	DIODE RD6.8M-B			
D16	8-719-047-37	DIODE BAS16			
D17	8-719-047-37	DIODE BAS16			
		< FILTER,>			
F1	1-233-888-11	FILTER, BAND PASS			
F2	1-233-889-11	FILTER, BAND PASS			
F3	1-767-454-11	FILTER, SAW			
F4	1-567-107-71	FILTER, CERAMIC			
F5	1-760-785-11	FILTER, CERAMIC			
		< IC >			
IC1	8-759-459-06	IC MC13156DWR2			
IC2	8-759-294-10	IC TB31202FN			
IC3	8-759-480-75	IC LSC442350DW			
IC4	8-759-044-34	IC NM93C46EM8			
IC5	8-759-060-00	IC BA10324AF			
IC6	8-759-479-97	IC TA31103F			
IC7	8-719-821-66	IC PHOTO COUPLER TLP627			
IC8	8-719-018-89	IC PHOTO COUPLER LTV817-C			
IC9	8-759-701-56	IC NJM78M05FA			

BASE MAIN

Ref. No.	Part No.	Description			Remark
IC10	8-759-481-67	IC TL7757CD			
		< JACK >			
J7	1-565-999-11	JACK, MODULAR 2P (LINE)			
J8	1-580-727-11	JACK (DC IN 9V)			
		< COIL >			
L13	1-412-599-11	INDUCTOR CHIP	3.3uH		
L21	1-408-117-00	INDUCTOR	10uH		
L22	1-412-599-11	INDUCTOR CHIP	3.3uH		
L23	1-408-117-00	INDUCTOR	10uH		
L24	1-408-117-00	INDUCTOR	10uH		
L25	1-408-117-00	INDUCTOR	10uH		
L26	1-408-117-00	INDUCTOR	10uH		
L27	1-408-117-00	INDUCTOR	10uH		
L28	1-408-117-00	INDUCTOR	10uH		
		< TRANSISTOR >			
Q1	8-729-041-21	TRANSISTOR	BFR92ALT1		
Q2	8-729-141-94	TRANSISTOR	2SC4094R37		
Q3	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q4	8-729-145-13	TRANSISTOR	2SC3356-(R25)		
Q5	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q6	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q7	8-729-041-22	TRANSISTOR	CF739R		
Q8	8-729-041-21	TRANSISTOR	BFR92ALT1		
Q9	8-729-041-21	TRANSISTOR	BFR92ALT1		
Q10	8-729-041-21	TRANSISTOR	BFR92ALT1		
Q11	8-729-041-21	TRANSISTOR	BFR92ALT1		
Q12	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q13	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q14	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q15	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q16	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q17	T-941-615-31	TRANSISTOR	MMBT3904LT1		
		< RESISTOR >			
R1	1-216-296-00	METAL CHIP	0	5%	1/8W
R2	1-216-809-11	METAL CHIP	100	5%	1/16W
R3	1-216-839-11	METAL CHIP	33K	5%	1/16W
R4	1-216-839-11	METAL CHIP	33K	5%	1/16W
R5	1-218-447-11	METAL GLAZE	62K	5%	1/16W
R6	1-216-809-11	METAL CHIP	100	5%	1/16W
R7	1-216-817-11	METAL CHIP	470	5%	1/16W
R8	1-216-846-11	METAL CHIP	120K	5%	1/16W
R9	1-216-813-11	METAL CHIP	220	5%	1/16W
R10	1-216-809-11	METAL CHIP	100	5%	1/16W
R11	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R12	1-216-852-11	METAL CHIP	390K	5%	1/16W
R13	1-216-813-11	METAL CHIP	220	5%	1/16W
R14	1-216-815-11	METAL CHIP	330	5%	1/16W
R15	1-216-821-11	METAL CHIP	1K	5%	1/16W
R16	1-216-847-11	METAL CHIP	150K	5%	1/16W
R17	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R18	1-216-815-11	METAL CHIP	330	5%	1/16W
R19	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R20	1-218-653-11	METAL CHIP	24	0.50%	1/16W

Ref. No.	Part No.	Description			Remark
R21	1-216-815-11	METAL CHIP	330	5%	1/16W
R22	1-216-817-11	METAL CHIP	470	5%	1/16W
R24	1-216-845-11	METAL CHIP	100K	5%	1/16W
R25	1-216-045-00	METAL CHIP	680	5%	1/10W
R26	1-216-845-11	METAL CHIP	100K	5%	1/16W
R27	1-216-833-11	METAL CHIP	10K	5%	1/16W
R28	1-216-683-11	METAL CHIP	22K	0.5%	1/10W
R29	1-216-813-11	METAL CHIP	220	5%	1/16W
R30	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R31	1-216-635-11	METAL CHIP	220	0.5%	1/10W
R32	1-216-817-11	METAL CHIP	470	5%	1/16W
R33	1-216-808-11	METAL CHIP	82	5%	1/16W
R34	1-216-809-11	METAL CHIP	100	5%	1/16W
R35	1-216-808-11	METAL CHIP	82	5%	1/16W
R36	1-216-853-11	METAL CHIP	470K	5%	1/16W
R37	1-216-809-11	METAL CHIP	100	5%	1/16W
R38	1-216-679-11	METAL CHIP	15K	0.5%	1/10W
R39	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R40	1-216-635-11	METAL CHIP	220	0.5%	1/10W
R41	1-216-817-11	METAL CHIP	470	5%	1/16W
R42	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R43	1-216-846-11	METAL CHIP	120K	5%	1/16W
R44	1-216-821-11	METAL CHIP	1K	5%	1/16W
R45	1-216-833-11	METAL CHIP	10K	5%	1/16W
R46	1-216-833-11	METAL CHIP	10K	5%	1/16W
R47	1-218-347-11	METAL GLAZE	91K	5%	1/16W
R48	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R49	1-216-845-11	METAL CHIP	100K	5%	1/16W
R50	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R51	1-216-833-11	METAL CHIP	10K	5%	1/16W
R52	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R53	1-216-833-11	METAL CHIP	10K	5%	1/16W
R54	1-216-833-11	METAL CHIP	10K	5%	1/16W
R55	1-216-846-11	METAL CHIP	120K	5%	1/16W
R56	1-216-821-11	METAL CHIP	1K	5%	1/16W
R57	1-216-833-11	METAL CHIP	10K	5%	1/16W
R58	1-216-839-11	METAL CHIP	33K	5%	1/16W
R60	1-216-815-11	METAL CHIP	330	5%	1/16W
R61	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R62	1-216-845-11	METAL CHIP	100K	5%	1/16W
R63	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R64	1-218-447-11	METAL GLAZE	62K	5%	1/16W
R65	1-216-853-11	METAL CHIP	470K	5%	1/16W
R66	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R67	1-216-833-11	METAL CHIP	10K	5%	1/16W
R68	1-216-833-11	METAL CHIP	10K	5%	1/16W
R69	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R70	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R71	1-216-032-00	METAL CHIP	200	5%	1/10W
R72	1-216-837-11	METAL CHIP	22K	5%	1/16W
R73	1-216-845-11	METAL CHIP	100K	5%	1/16W
R74	1-216-845-11	METAL CHIP	100K	5%	1/16W
R75	1-216-821-11	METAL CHIP	1K	5%	1/16W
R76	1-216-838-11	METAL CHIP	27K	5%	1/16W
R77	1-216-845-11	METAL CHIP	100K	5%	1/16W
R78	1-215-862-11	METAL OXIDE	68	5%	1W F
R79	1-216-833-11	METAL CHIP	10K	5%	1/16W

Ref. No.	Part No.	Description			Remark
R80	1-216-841-11	METAL CHIP	47K	5%	1/16W
R81	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R82	1-216-841-11	METAL CHIP	47K	5%	1/16W
R84	1-216-833-11	METAL CHIP	10K	5%	1/16W
R85	1-216-841-11	METAL CHIP	47K	5%	1/16W
R89	1-216-834-11	METAL CHIP	12K	5%	1/16W
R90	1-216-834-11	METAL CHIP	12K	5%	1/16W
R91	1-216-864-11	METAL CHIP	0	5%	1/16W
R92	1-216-835-11	METAL CHIP	15K	5%	1/16W
R93	1-216-841-11	METAL CHIP	47K	5%	1/16W
R94	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R95	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R96	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R97	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R98	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R99	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R100	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R101	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R102	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R103	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R104	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R105	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R106	1-216-833-11	METAL CHIP	10K	5%	1/16W
R107	1-216-833-11	METAL CHIP	10K	5%	1/16W
R108	1-216-854-11	METAL CHIP	560K	5%	1/16W
R109	1-216-848-11	METAL CHIP	180K	5%	1/16W
R110	1-216-848-11	METAL CHIP	180K	5%	1/16W
R111	1-216-848-11	METAL CHIP	180K	5%	1/16W
R112	1-216-844-11	METAL CHIP	82K	5%	1/16W
R113	1-218-448-11	METAL GLAZE	430K	5%	1/16W
R115	1-216-821-11	METAL CHIP	1K	5%	1/16W
R116	1-216-850-11	METAL CHIP	270K	5%	1/16W
R117	1-216-853-11	METAL CHIP	470K	5%	1/16W
R118	1-216-855-11	METAL CHIP	680K	5%	1/16W
R119	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R120	1-216-839-11	METAL CHIP	33K	5%	1/16W
R121	1-216-816-11	METAL CHIP	390	5%	1/16W
R122	1-216-686-11	METAL CHIP	30K	0.5%	1/10W
R123	1-216-666-11	METAL CHIP	4.3K	0.5%	1/10W
R124	1-216-853-11	METAL CHIP	470K	5%	1/16W
R125	1-216-857-11	METAL CHIP	1M	5%	1/16W
R126	1-216-841-11	METAL CHIP	47K	5%	1/16W
R127	1-216-853-11	METAL CHIP	470K	5%	1/16W
R128	1-216-845-11	METAL CHIP	100K	5%	1/16W
R129	1-202-929-11	METAL GLAZE	360K	5%	1/16W
R130	1-216-847-11	METAL CHIP	150K	5%	1/16W
R131	1-216-847-11	METAL CHIP	150K	5%	1/16W
R132	1-216-847-11	METAL CHIP	150K	5%	1/16W
R133	1-216-821-11	METAL CHIP	1K	5%	1/16W
R134	1-216-833-11	METAL CHIP	10K	5%	1/16W
R136	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R138	1-216-222-00	METAL GLAZE	10K	5%	1/8W
R139	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R140	1-216-818-11	METAL CHIP	560	5%	1/16W
R141	1-216-617-11	METAL CHIP	39	1%	1/10W
R142	1-216-661-11	METAL CHIP	2.7K	0.5%	1/10W
R143	1-216-651-11	METAL CHIP	1K	0.5%	1/10W
R144	1-216-864-11	METAL CHIP	0	5%	1/16W

Ref. No.	Part No.	Description			Remark
R145	1-216-857-11	METAL CHIP	1M	5%	1/16W
R146	1-216-841-11	METAL CHIP	47K	5%	1/16W
R148	1-216-032-00	METAL CHIP	200	5%	1/10W
R149	1-216-864-11	METAL CHIP	0	5%	1/16W
R150	1-216-833-11	METAL CHIP	10K	5%	1/16W
R151	1-216-857-11	METAL CHIP	1M	5%	1/16W
R154	1-216-837-11	METAL CHIP	22K	5%	1/16W
R155	1-216-837-11	METAL CHIP	22K	5%	1/16W
R157	1-216-864-11	METAL CHIP	0	5%	1/16W
		< VARIABLE RESISTOR >			
R114	1-228-993-00	RES, ADJ, METAL 4.7K (MODULATION LEVEL)			
R135	1-228-993-00	RES, ADJ, METAL 4.7K (TX DEVIATION)			
		< SWITCH >			
S1	1-571-377-11	SWITCH, SLIDE (DIAL MODE)			
		< TRANSFORMER >			
T1	1-431-208-11	TRANSFORMER, LINE			
		< FUSE >			
W1	1-533-842-11	FUSE (250mA)			
		< VIBRATOR >			
X1	1-577-130-11	VIBRATOR, CRYSTAL (4MHz)			
**********					
*	A-3672-305-A	HAND MAIN BOARD, COMPLETE			
		**********			
	1-771-178-11	SWITCH, SHEET			
	3-012-337-01	CASE (REAR), SHIELD			
	3-016-288-01	HOLDER (MIC)			
	3-016-289-01	CASE (FRONT), SHIELD			
	3-016-290-01	TERMINAL (CHARGE HAND)			
	3-016-291-01	TERMINAL (CHARGE HAND)			
	7-685-105-19	SCREW +P 2X8 TYPE2 NON-SLIT			
		< BUZZER >			
BZ1	1-505-594-21	BUZZER			
		< CAPACITOR >			
C1	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C2	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C3	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C4	1-162-918-11	CERAMIC CHIP	18PF	5%	50V
C5	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C6	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C7	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C8	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C9	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C10	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C11	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C12	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C13	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C14	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C15	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C16	1-162-923-11	CERAMIC CHIP	47PF	5%	50V

HAND MAIN

Ref. No.	Part No.	Description			Remark
C17	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C18	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C19	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C20	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C21	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C22	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C23	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C24	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C25	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C26	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C27	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C28	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C29	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C30	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C31	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C32	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C33	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C34	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C35	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C36	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C37	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C38	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C39	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C40	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C41	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C42	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C43	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C44	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C45	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C46	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C47	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C48	1-162-922-11	CERAMIC CHIP	39PF	5%	50V
C50	1-162-907-11	CERAMIC CHIP	2PF	0.25PF	50V
C51	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C52	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C53	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C54	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C55	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C56	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C57	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C58	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C59	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C60	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C61	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C62	1-162-907-11	CERAMIC CHIP	2PF	0.25PF	50V
C63	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C64	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C65	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C66	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C67	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C68	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C69	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C70	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C71	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C72	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C73	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C74	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V

Ref. No.	Part No.	Description			Remark
C75	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C76	1-164-174-11	CERAMIC CHIP	0.0082uF	10%	25V
C77	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
C78	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C79	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C80	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C81	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C82	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C83	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C84	1-162-977-11	CERAMIC CHIP	0.0018uF	10%	50V
C85	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C86	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C89	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C90	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C91	1-162-918-11	CERAMIC CHIP	18PF	5%	50V
C93	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C95	1-801-729-11	VARISTOR, CHIP			
C96	1-126-791-11	ELECT	10uF	20%	16V
C97	1-801-729-11	VARISTOR, CHIP			
C99	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C100	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C101	1-162-977-11	CERAMIC CHIP	0.0018uF	10%	50V
C102	1-135-208-11	TANTAL. CHIP	1uF	10%	10V
C104	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C105	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C106	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C107	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C108	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C109	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C111	1-162-965-11	CERAMIC CHIP	0.0015uF	10%	50V
C112	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C113	1-135-212-21	TANTAL. CHIP	2.2uF	20%	20V
C114	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C116	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C117	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C118	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C119	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C121	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C122	1-135-212-21	TANTAL. CHIP	2.2uF	20%	20V
C123	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C124	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C125	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C126	1-135-212-21	TANTAL. CHIP	2.2uF	20%	20V
C127	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C128	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C129	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C130	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C131	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C132	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C133	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
C134	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C135	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
C136	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C138	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C139	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C140	1-162-923-11	CERAMIC CHIP	47PF	5%	50V

Ref. No.	Part No.	Description	Remark
		< TRIMMER >	
C49	1-141-372-11	CAP, TRIMMER 5PF	
C87	1-141-374-11	CAP, TRIMMER 20PF	
C88	1-141-372-11	CAP, TRIMMER 5PF	
C92	1-141-374-11	CAP, TRIMMER 20PF	
		< DIODE >	
D1	8-719-033-90	DIODE 1SV229-TPH3	
D2	8-719-033-90	DIODE 1SV229-TPH3	
D3	8-719-033-90	DIODE 1SV229-TPH3	
D4	8-719-062-55	LED MS31D (BATT LOW)	
D5	8-719-062-54	LED MG31D (TALK)	
D6	8-719-047-37	DIODE BAS16	
D7	8-719-047-37	DIODE BAS16	
D8	8-719-909-90	DIODE BAV99	
D11	8-719-047-37	DIODE BAS16	
		< FILTER>	
F1	1-233-888-11	FILTER, BAND PASS	
F2	1-233-889-11	FILTER, BAND PASS	
F3	1-767-472-11	FILTER, SAW	
F4	1-567-107-71	FILTER, CERAMIC	
F5	1-760-785-11	FILTER, CERAMIC	
		< IC >	
IC1	8-759-461-45	IC MC13156FB	
IC2	8-759-294-10	IC TB31202FN	
IC3	8-759-480-74	IC LSC442349DW	
IC5	8-759-060-00	IC BA10324AF	
IC7	8-759-479-97	IC TA31103F	
IC11	8-759-480-76	IC LP2953IM	
		< COIL >	
L2	1-412-599-11	INDUCTOR CHIP 3.3uH	
L13	1-412-599-11	INDUCTOR CHIP 3.3uH	
		< MICROPHONE>	
MIC1	1-542-260-31	MICROPHONE, ELECTRET CONDENSER	
		< TRANSISTOR >	
Q1	8-729-041-21	TRANSISTOR BFR92ALT1	
Q2	8-729-141-94	TRANSISTOR 2SC4094R37	
Q3	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q4	8-729-145-13	TRANSISTOR 2SC3356-(R25)	
Q5	T-941-615-31	TRANSISTOR MMBT3904LT1	
Q6	T-941-615-31	TRANSISTOR MMBT3904LT1	
Q7	8-729-041-22	TRANSISTOR CF739R	
Q8	8-729-041-21	TRANSISTOR BFR92ALT1	
Q9	8-729-041-21	TRANSISTOR BFR92ALT1	
Q10	8-729-041-21	TRANSISTOR BFR92ALT1	
Q11	8-729-041-21	TRANSISTOR BFR92ALT1	
Q12	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q13	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q14	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q15	T-941-615-31	TRANSISTOR MMBT3904LT1	
Q16	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q17	T-941-615-31	TRANSISTOR MMBT3904LT1	
Q18	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q19	8-729-026-07	TRANSISTOR MMBT3906LT1	
Q20	T-941-615-31	TRANSISTOR MMBT3904LT1	
		< RESISTOR >	
R1	1-216-296-00	METAL CHIP 0 5% 1/8W	
R2	1-216-805-11	METAL CHIP 47 5% 1/16W	
R3	1-216-835-11	METAL CHIP 15K 5% 1/16W	
R4	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R5	1-216-838-11	METAL CHIP 27K 5% 1/16W	
R6	1-216-806-11	METAL GLAZE 56 5% 1/16W	
R7	1-216-817-11	METAL CHIP 470 5% 1/16W	
R8	1-216-844-11	METAL CHIP 82K 5% 1/16W	
R9	1-216-809-11	METAL CHIP 100 5% 1/16W	
R10	1-216-809-11	METAL CHIP 100 5% 1/16W	
R11	1-216-823-11	METAL CHIP 1.5K 5% 1/16W	
R12	1-216-852-11	METAL CHIP 390K 5% 1/16W	
R13	1-216-813-11	METAL CHIP 220 5% 1/16W	
R14	1-216-815-11	METAL CHIP 330 5% 1/16W	
R15	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R16	1-216-847-11	METAL CHIP 150K 5% 1/16W	
R17	1-216-823-11	METAL CHIP 1.5K 5% 1/16W	
R19	1-218-653-11	METAL CHIP 24 0.50% 1/16W	
R20	1-218-653-11	METAL CHIP 24 0.50% 1/16W	
R21	1-216-815-11	METAL CHIP 330 5% 1/16W	
R22	1-216-817-11	METAL CHIP 470 5% 1/16W	
R23	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R24	1-216-849-11	METAL CHIP 220K 5% 1/16W	
R25	1-216-809-11	METAL CHIP 100 5% 1/16W	
R26	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R27	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R28	1-216-675-11	METAL CHIP 10K 0.5% 1/10W	
R29	1-216-805-11	METAL CHIP 47 5% 1/16W	
R30	1-216-679-11	METAL CHIP 15K 0.5% 1/10W	
R31	1-216-631-11	METAL CHIP 150 0.5% 1/10W	
R32	1-216-817-11	METAL CHIP 470 5% 1/16W	
R33	1-216-807-11	METAL CHIP 68 5% 1/16W	
R34	1-216-809-11	METAL CHIP 100 5% 1/16W	
R35	1-216-807-11	METAL CHIP 68 5% 1/16W	
R36	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R37	1-218-653-11	METAL CHIP 24 0.50% 1/16W	
R38	1-216-675-11	METAL CHIP 10K 0.5% 1/10W	
R39	1-216-679-11	METAL CHIP 15K 0.5% 1/10W	
R40	1-216-627-11	METAL CHIP 100 0.5% 1/10W	
R41	1-216-817-11	METAL CHIP 470 5% 1/16W	
R42	1-216-823-11	METAL CHIP 1.5K 5% 1/16W	
R43	1-218-295-11	METAL GLAZE 43K 5% 1/16W	
R44	1-216-809-11	METAL CHIP 100 5% 1/16W	
R45	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R46	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R47	1-218-347-11	METAL GLAZE 91K 5% 1/16W	
R48	1-219-570-11	METAL GLAZE 10M 5% 1/16W	
R49	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R50	1-218-653-11	METAL CHIP 24 0.50% 1/16W	
R51	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R52	1-218-653-11	METAL CHIP 24 0.50% 1/16W	
R53	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R54	1-216-833-11	METAL CHIP 10K 5% 1/16W	

HAND MAIN

Ref. No.	Part No.	Description			Remark
R55	1-218-295-11	METAL GLAZE	43K	5%	1/16W
R56	1-216-809-11	METAL CHIP	100	5%	1/16W
R57	1-216-833-11	METAL CHIP	10K	5%	1/16W
R58	1-216-839-11	METAL CHIP	33K	5%	1/16W
R60	1-216-815-11	METAL CHIP	330	5%	1/16W
R61	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R62	1-216-845-11	METAL CHIP	100K	5%	1/16W
R63	1-216-841-11	METAL CHIP	47K	5%	1/16W
R65	1-216-849-11	METAL CHIP	220K	5%	1/16W
R66	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R67	1-216-833-11	METAL CHIP	10K	5%	1/16W
R68	1-216-833-11	METAL CHIP	10K	5%	1/16W
R69	1-216-841-11	METAL CHIP	47K	5%	1/16W
R70	1-216-841-11	METAL CHIP	47K	5%	1/16W
R71	1-216-809-11	METAL CHIP	100	5%	1/16W
R72	1-216-841-11	METAL CHIP	47K	5%	1/16W
R74	1-216-845-11	METAL CHIP	100K	5%	1/16W
R75	1-216-845-11	METAL CHIP	100K	5%	1/16W
R76	1-216-818-11	METAL CHIP	560	5%	1/16W
R77	1-216-835-11	METAL CHIP	15K	5%	1/16W
R78	1-216-809-11	METAL CHIP	100	5%	1/16W
R79	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R80	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R81	1-216-849-11	METAL CHIP	220K	5%	1/16W
R82	1-216-853-11	METAL CHIP	470K	5%	1/16W
R83	1-218-759-11	METAL CHIP	200K	0.50%	1/10W
R84	1-216-699-11	METAL CHIP	100K	0.5%	1/10W
R85	1-218-758-11	METAL CHIP	180K	0.50%	1/10W
R86	1-216-699-11	METAL CHIP	100K	0.5%	1/10W
R87	1-218-756-11	METAL CHIP	150K	0.50%	1/10W
R88	1-216-699-11	METAL CHIP	100K	0.5%	1/10W
R89	1-216-856-11	METAL CHIP	820K	5%	1/16W
R90	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R91	1-216-854-11	METAL CHIP	560K	5%	1/16W
R92	1-216-833-11	METAL CHIP	10K	5%	1/16W
R93	1-216-833-11	METAL CHIP	10K	5%	1/16W
R94	1-216-835-11	METAL CHIP	15K	5%	1/16W
R95	1-216-845-11	METAL CHIP	100K	5%	1/16W
R96	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R97	1-216-841-11	METAL CHIP	47K	5%	1/16W
R98	1-216-833-11	METAL CHIP	10K	5%	1/16W
R99	1-216-841-11	METAL CHIP	47K	5%	1/16W
R100	1-216-821-11	METAL CHIP	1K	5%	1/16W
R101	1-216-833-11	METAL CHIP	10K	5%	1/16W
R102	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R103	1-202-931-11	METAL GLAZE	910K	5%	1/16W
R105	1-216-849-11	METAL CHIP	220K	5%	1/16W
R106	1-216-833-11	METAL CHIP	10K	5%	1/16W
R107	1-216-833-11	METAL CHIP	10K	5%	1/16W
R108	1-216-848-11	METAL CHIP	180K	5%	1/16W
R109	1-216-848-11	METAL CHIP	180K	5%	1/16W
R110	1-216-848-11	METAL CHIP	180K	5%	1/16W
R111	1-216-837-11	METAL CHIP	22K	5%	1/16W
R112	1-216-856-11	METAL CHIP	820K	5%	1/16W
R114	1-216-821-11	METAL CHIP	1K	5%	1/16W
R115	1-216-847-11	METAL CHIP	150K	5%	1/16W
R116	1-216-848-11	METAL CHIP	180K	5%	1/16W
R117	1-216-813-11	METAL CHIP	220	5%	1/16W
R120	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R121	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R122	1-216-821-11	METAL CHIP	1K	5%	1/16W
R123	1-216-845-11	METAL CHIP	100K	5%	1/16W
R124	1-216-835-11	METAL CHIP	15K	5%	1/16W
R125	1-216-856-11	METAL CHIP	820K	5%	1/16W
R126	1-216-864-11	METAL CHIP	0	5%	1/16W
R127	1-216-853-11	METAL CHIP	470K	5%	1/16W
R128	1-218-331-11	METAL GLAZE	51K	5%	1/16W
R129	1-216-847-11	METAL CHIP	150K	5%	1/16W
R130	1-216-847-11	METAL CHIP	150K	5%	1/16W
R131	1-216-847-11	METAL CHIP	150K	5%	1/16W
R132	1-216-821-11	METAL CHIP	1K	5%	1/16W
R133	1-216-835-11	METAL CHIP	15K	5%	1/16W
R134	1-216-845-11	METAL CHIP	100K	5%	1/16W
R135	1-216-856-11	METAL CHIP	820K	5%	1/16W
R137	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R138	1-216-821-11	METAL CHIP	1K	5%	1/16W
R139	1-216-799-11	METAL CHIP	15	5%	1/16W
R140	1-216-849-11	METAL CHIP	220K	5%	1/16W
R141	1-216-841-11	METAL CHIP	47K	5%	1/16W
R142	1-216-817-11	METAL CHIP	470	5%	1/16W
R143	1-216-845-11	METAL CHIP	100K	5%	1/16W
R144	1-216-853-11	METAL CHIP	470K	5%	1/16W
R145	1-216-857-11	METAL CHIP	1M	5%	1/16W
R146	1-216-857-11	METAL CHIP	1M	5%	1/16W
R147	1-216-854-11	METAL CHIP	560K	5%	1/16W
		< VARIABLE RESISTOR >			
R113	1-238-664-11	RES, ADJ, CERMET	10K (DEMODULATION LEVEL)		
R119	1-238-664-11	RES, ADJ, CERMET	10K (TX DEVIATION)		
		< SWITCH >			
S19	1-571-377-11	SWITCH, SLIDE (VOL)			
		< SPEAKER >			
SP1	1-505-593-11	SPEAKER (2.8cm)			
		< VIBRATOR >			
X1	1-577-130-11	VIBRATOR, CRYSTAL (4MHz)			
**********					
		MISCELLANEOUS			
		**********			
51	1-771-178-11	SWITCH, SHEET			
52	1-771-177-11	SWITCH, RUBBER KEY			
ANT1	1-501-951-11	ANTENNA			
ANT11	1-501-904-11	TELESCOPIC ANTENNA			
MIC1	1-542-260-31	MICROPHONE, ELECTRET CONDENSER			
SP1	1-505-593-11	SPEAKER (2.8cm)			
**********					

Ref. No.	Part No.	Description	Remark
		ACCESSORIES & PACKING MATERIALS	
		**********	
⚠	1-467-081-21	ADAPTOR, AC (AC-T37) (US,Canadian)	
⚠	1-467-498-21	ADAPTOR, AC (AC-T47) (E)	
	1-528-769-11	BATTERY PACK (BP-T23)	
	1-696-453-21	CORD (WITH MODULAR PLUG)(LINE) (15cm)	
	1-696-454-11	CORD (WITH MODULAR PLUG)(LINE) (215cm)	
	3-010-356-11	LABEL (MEMORY)	
	3-010-453-01	CASE, WALL HOOK	
	3-012-609-01	SPACER (WALL HOOK)	
	3-016-232-01	GUIDE, QUICK START (US)	
	3-016-232-11	GUIDE, QUICK START (Canadian)	
	3-860-376-11	MANUAL, INSTRUCTION (ENGLISH,SPANICH)	(US)
	3-860-376-21	MANUAL, INSTRUCTION (ENGLISH,FRENCH)	(Canadian)
	3-860-376-31	MANUAL, INSTRUCTION (ENGLISH,SPANISH, RUSSIAN,CHINESE) (E)	
	7-621-849-40	SCREW,WOOD +R 3.1X25	

****

****

HARDWARE LIST

****

#1	7-623-208-22	SW 3,TYPE 2
#2	7-685-105-19	SCREW +P 2X8 TYPE2 NON-SLIT
#3	7-685-650-79	SCREW +P 3X16 TYPE2 NON-SLIT
#4	7-685-547-19	SCREW +BTP 3X10 TYPE2 N-S
#5	7-685-548-19	SCREW +BTP 3X12 TYPE2 N-S
#6	7-685-104-19	SCREW +BTP 2X6 TYPE2

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Sony Corporation
Personal & Mobile Communication Company

9-925-735-11

97H0231-1
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Published by Quality Assurance Dept.

SPP-930

SONY

SERVICE MANUAL

US Model
Canadian Model
E Model

SUPPLEMENT - 3

File this Supplement with the Service Manual.

Subject :

- **CHANGE OF BOARDS**
- **CENTRAL & SOUTH AMERICA MODEL ADDED**
- **A MODEL IN CREAM COLOR HAS BEEN ADDED FOR US MODEL**

(ECN-CP701144)

TABLE OF CONTENTS

1. LOCATION AND FUNCTION OF CONTROLS 2

2. CHANGE OF BOARDS 3

3. ADJUSTMENTS
3-1. Base Unit Section 4
3-2. Handset Section 6

4. DIAGRAMS
4-1. Printed Wiring Boards (Handset Section) 8
4-2. Schematic Diagram (Handset Section) 11
4-3. Schematic Diagram (Base Unit Section) 14
4-4. Printed Wiring Boards (Base Unit Section) 17

5. EXPLODED VIEWS
5-1. Base Unit Section 21
5-2. Handset Section 22

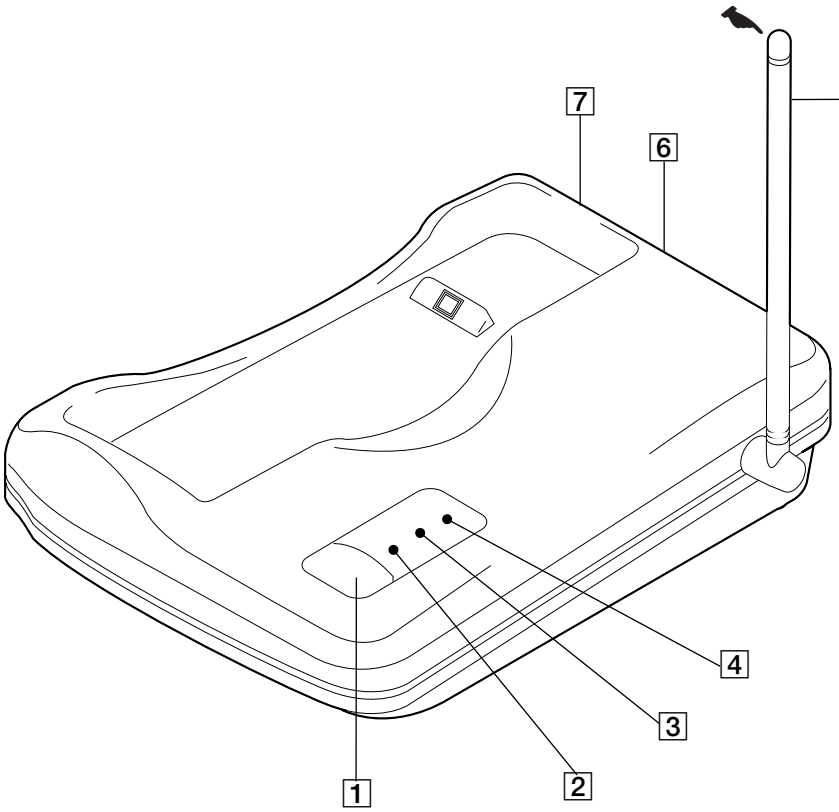
6. ELECTRICAL PARTS LIST 23

1. LOCATION AND FUNCTION OF CONTROLS

(Service Manual See page 3)

BASE UNIT

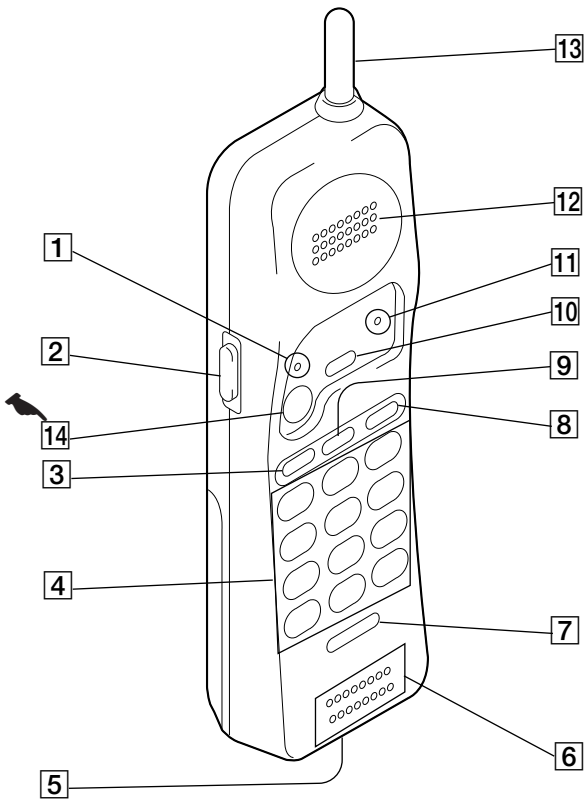
☛ : Changed portion



1. PAGE button
2. CHARGE lamp
3. IN USE lamp
4. POWER lamp
5. Antenna
6. DC IN 9V jack
7. LINE (Telephone) jack

HANDSET

☛ : Corrected portion



1. TALK lamp
2. ☛ VOL(Volume) H/L switch
3. ☛ PGM (Program) button
4. Dialing keys
5. Charge terminals
6. Microphone
7. CHANNEL button
8. REDIAL button
9. SPEED DIAL button
10. OFF button
11. ☛ BATT LOW lamp
12. Speaker
13. Antenna
14. ☛ TALK/FLASH button

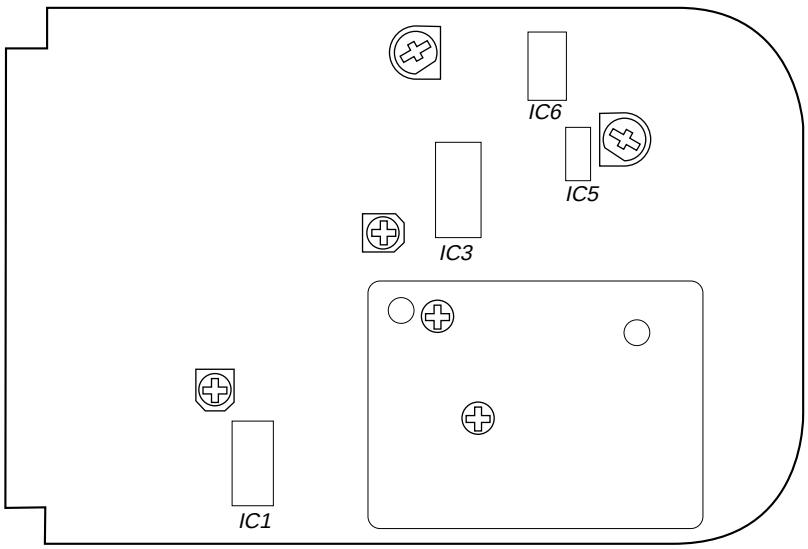
2. CHANGE OF BOARDS

The base main board was divided into base RF board and base TEL board.
Adjustment, printed wiring boards and schematic diagram of new type, and changed parts list are described in this Supplement-3.
Refer to original service manual (9-925-735-11), Supplement-1 (9-925-735-81) and supplement-2 (9-925-735-82) previously issued for the other information.

NEW TYPE IDENTIFICATION

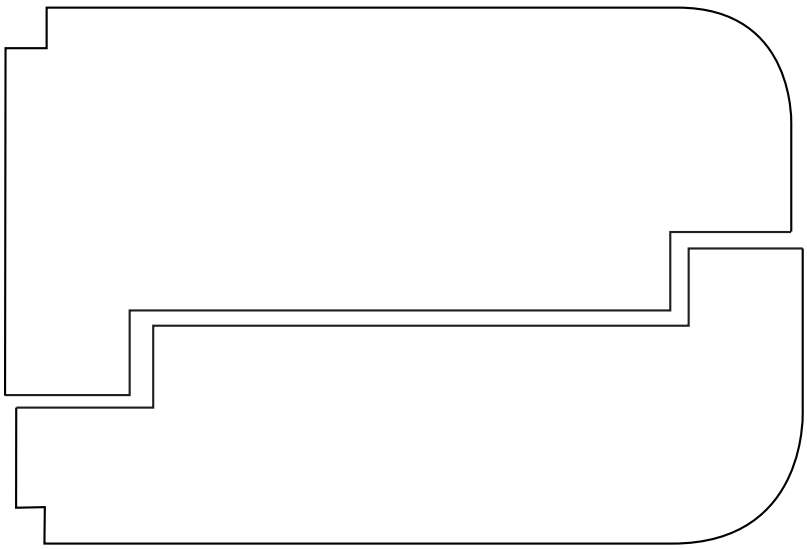
Former Type

[BASE MAIN BOARD]



New Type

[BASE RF BOARD]



[BASE TEL BOARD]

3. ADJUSTMENTS

3-1. BASE UNIT SECTION

• Perform the adjustment at 6CH (RX : 926.55MHz, TX : 903.8MHz) by removing R1 as a rule.

Former Type only

1. RX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 926.55MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX LOOP V (ATE terminal).
3. Adjust the C88 for 2.0V ± 0.2V reading on the digital voltmeter.

2. TX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the digital voltmeter to TX LOOP V (ATE terminal).
2. Adjust the C49 for 2.0V ± 0.2V reading on the digital voltmeter.

3. QUAD-TUNE VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX AUDIO (ATE terminal).
3. Adjust the C87 (Former type), C151 (New type) for 2.2V ± 0.1V reading on the digital voltmeter.

4. 4.0MHz CLOCK REFERENCE Adjustment

Procedure :

1. Connect the frequency counter to IC3 (㉔pin).
2. Adjust the C92 (Former type), C152 (New type) for 4.0MHz ± 500Hz reading on the frequency counter.

5. DEMODULATION LEVEL Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   - Carrier frequency : 903.8MHz
   - Modulation : 1kHz
   - Deviation : ± 25kHz
   - Output level : – 50 dBm (EMF)
2. Connect the modulation meter to IC6 (⑧pin).
3. Adjust the R114 for 21dBV ± 1dB reading on the modulation meter.

6. TX DEVIATION Adjustment

Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Adjust the R135 for DEVIATION = 25kHz ± 1.0kHz reading on the modulation meter.

7. TX power and TX frequency Confirmation

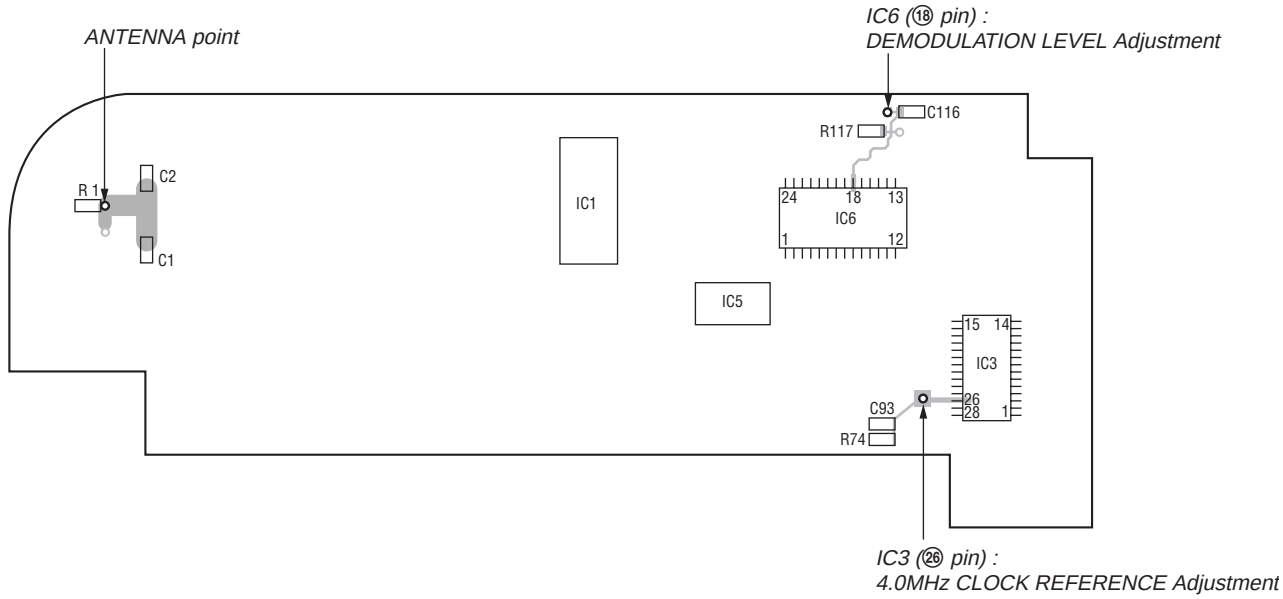
Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Confirm the TX power is – 5 dBm ± 2dB.
   Confirm the TX frequency is 903.8MHz ± 1kHz.

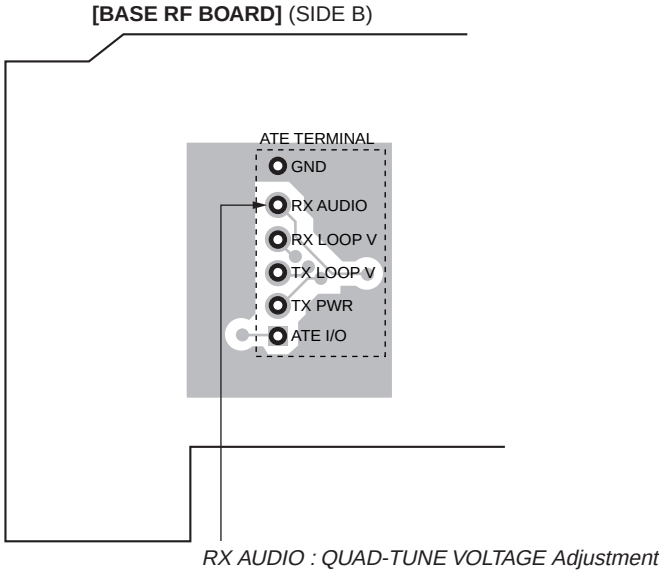
Connect and Adjustment Location : BASE Main board
(Former type : Service Manual see page 24)
Connect and Adjustment Location : BASE RF board
(New type : See page 5)

Connect Location (New type) :

[BASE RF BOARD] (SIDE A)

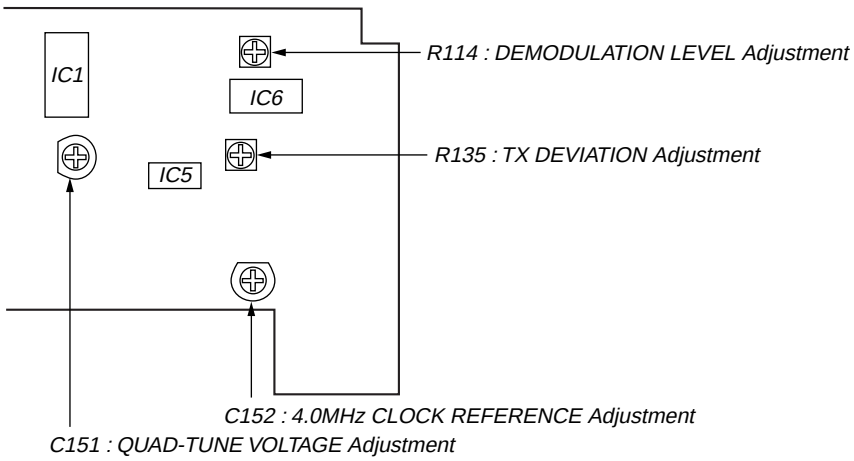


[BASE RF BOARD] (SIDE B)



Adjustment Location (New type) :

[BASE RF BOARD] (SIDE A)



3-2. HANDSET SECTION

• Perform the adjustment at 6CH (RX : 903.8MHz, TX : 926.55MHz) by removing R1 as a rule .

Former Type only

1. RX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   Carrier frequency : 903.8MHz
   Modulation : 1kHz
   Deviation : ± 25kHz
   Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX LOOP V (ATE terminal).
3. Adjust the C88 for 1.2V ± 0.2V reading on the digital voltmeter .

2. TX LOOP VOLTAGE Adjustment

Procedure :

1. Connect the digital voltmeter to TX LOOP V (ATE terminal).
2. Adjust the C49 for 1.2V ± 0.2V reading on the digital voltmeter .

3. QUAD-TUNE VOLTAGE Adjustment

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   Carrier frequency : 903.8MHz
   Modulation : 1kHz
   Deviation : ± 25kHz
   Output level : – 50 dBm (EMF)
2. Connect the digital voltmeter to RX AUDIO (ATE terminal)
3. Adjust the C87 for 1.2V ± 0.1V reading on the digital voltmeter .

4. 4.0MHz CLOCK REFERRENCE Adjustment

Procedure :

1. Connect the frequency counter to IC3 (㉖ pin).
2. Adjust the C92 for 4.0MHz ± 500Hz reading on the frequency counter .

5. DEMODULATION LEVEL Adjustment

• Remove the speaker from SP1 (RECEIVER).
• Set [VOL] switch (S19) in "L".

Procedure :

1. Connect the FM rf signal generator to ANTENNA point.
   FM rf signal generator condition :
   Carrier frequency : 903.8MHz
   Modulation : 1kHz
   Deviation : ± 25kHz
   Output level : – 50 dBm (EMF)
2. Connect the modulation meter to RECEIVER + (ATE terminal)
3. Adjust the R113 for – 19dBV ± 1dB reading on the modulation meter .

6. TX DEVIATION Adjustment

Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Adjust the R119 for TX DEVIATION= 25kHz ± 2kHz reading on the modulation meter .

7. TX power and TX frequency Confirmation

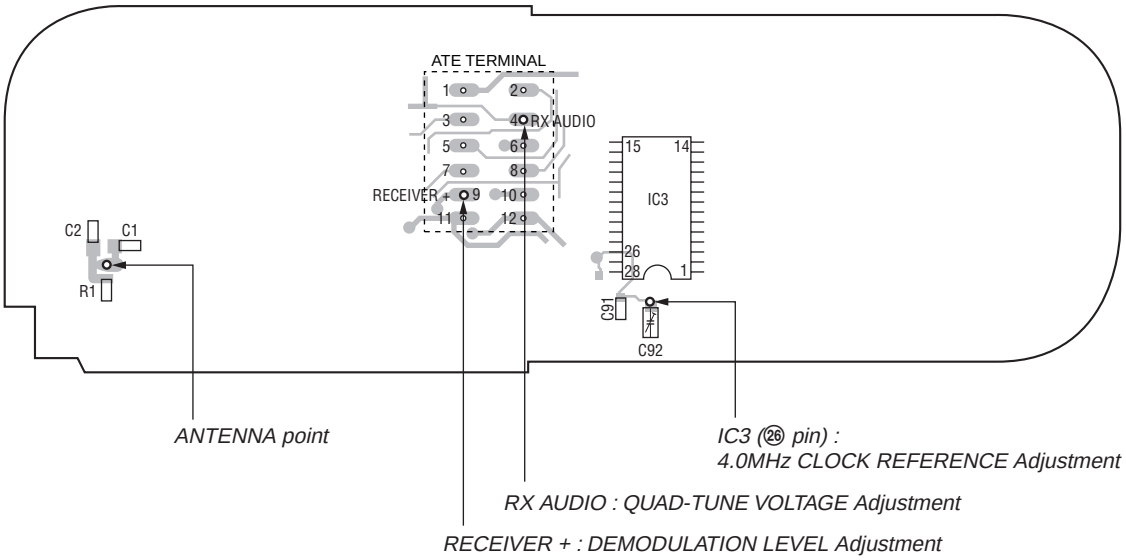
Procedure :

1. Connect the modulation meter to ANTENNA point.
2. Confirm the TX power is – 5 dBm ±2dB.
   Confirm the TX frequency is 926.55MHz ±1kHz.

Connect and Adjustments Location : HAND MAIN board
(Former type : Service Manual see page 26)
(New type : See page 7)

Connect Location (New type) :

[HAND MAIN BOARD] (SIDE A)



ANTENNA point

IC3 (㉖ pin) :
4.0MHz CLOCK REFERENCE Adjustment

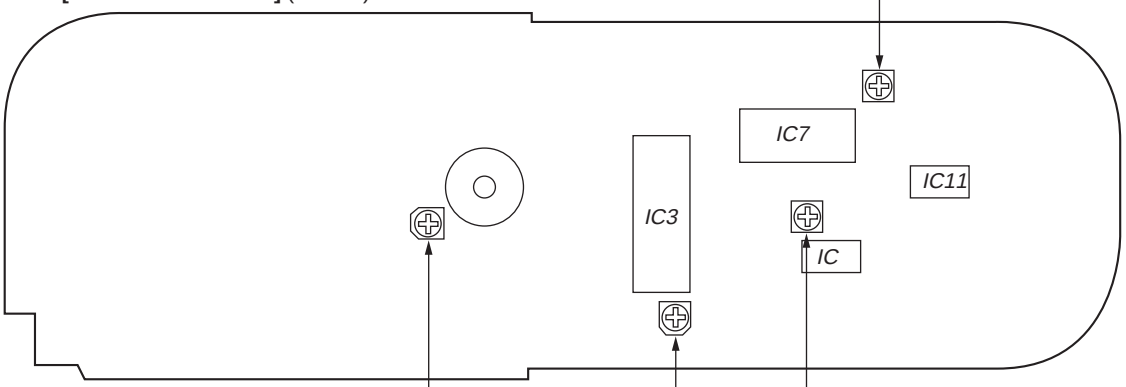
RX AUDIO : QUAD-TUNE VOLTAGE Adjustment

RECEIVER + : DEMODULATION LEVEL Adjustment

Adjustment Location (New type) :

R113 : DEMODULATION LEVEL Adjustment

[HAND MAIN BOARD] (SIDE A)



R119 : TX DEVIATION Adjustment

C92 : 4.0MHz CLOCK REFERENCE Adjustment

C87 : QUAD-TUNE VOLTAGE Adjustment

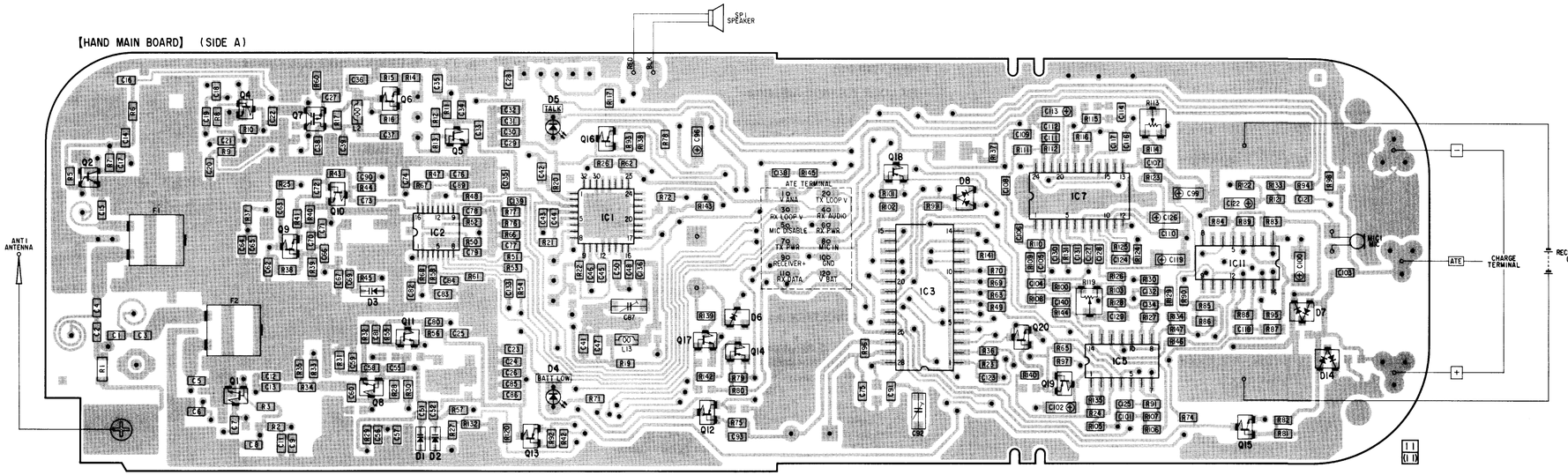
4. DIAGRAMS

4-1. PRINTED WIRING BOARDS (HANDSET SECTION)

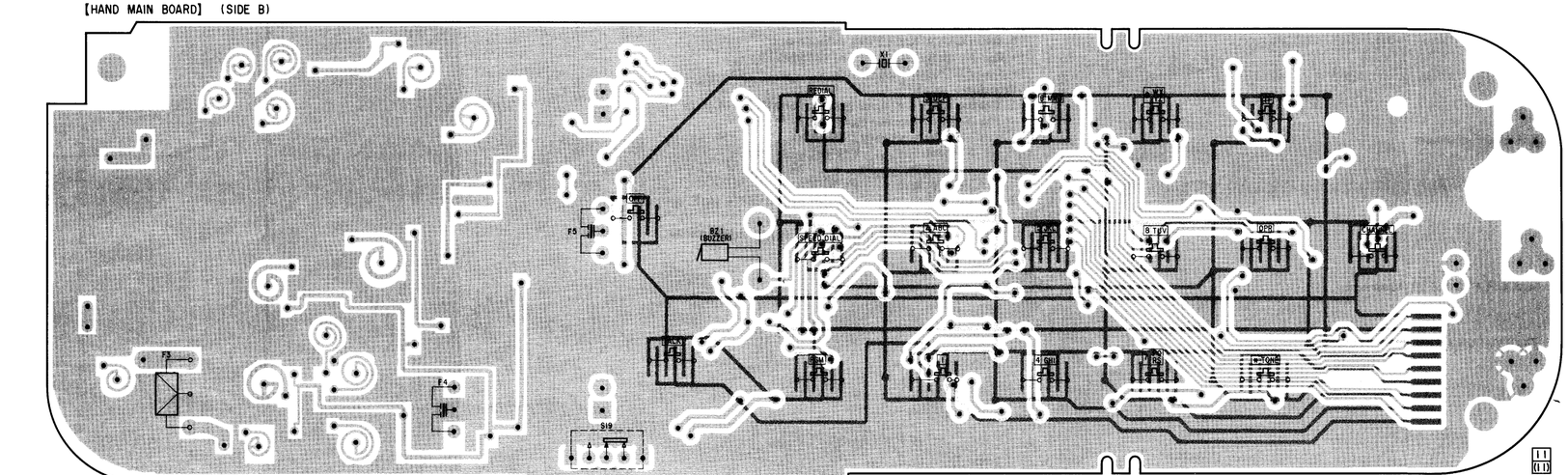
● SEMICONDUCTOR LOCATION

Ref. No.	Location	Ref. No.	Location
D1	E-5	Q4	B-3
D2	E-5	Q5	B-5
D3	D-4	Q6	B-5
D4	E-6		
D5	B-6	Q7	B-4
		Q8	E-4
D6	D-8	Q9	C-3
D7	D-14	Q10	C-4
D8	B-10	Q11	D-5
D14	D-14		
		Q12	E-8
		Q13	E-6
IC1	C-7	Q14	D-8
IC2	C-5	Q15	E-13
IC3	D-10	Q16	B-7
IC5	D-12		
IC7	C-11	Q17	D-8
		Q18	B-10
IC11	C-13	Q19	D-11
		Q20	D-11
Q1	E-3		
Q2	B-1		

【HAND MAIN BOARD】 (SIDE A)



【HAND MAIN BOARD】 (SIDE B)



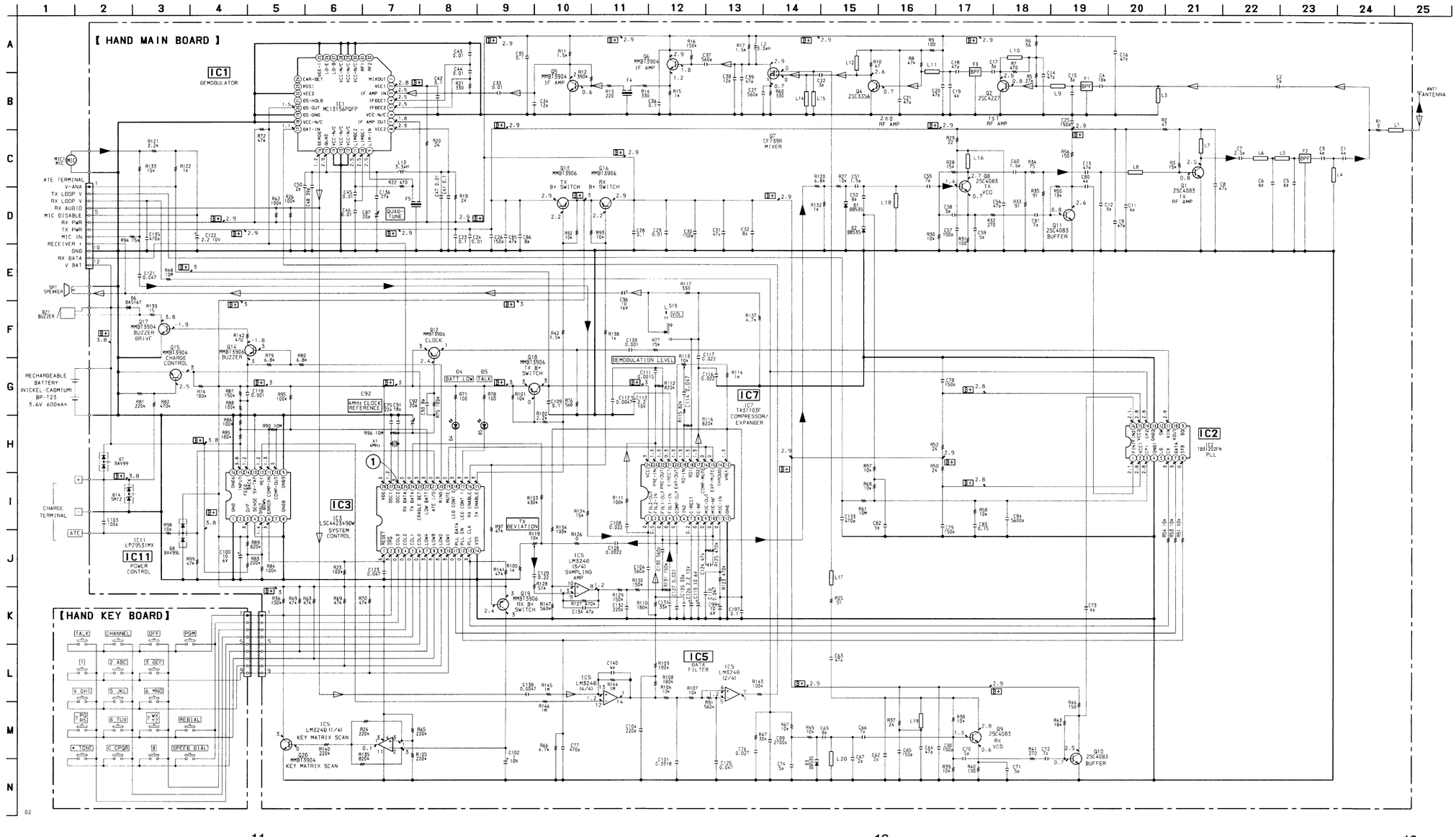
Note:
- ○——: parts extracted from the component side.
- ●: Through hole.
- □: Chip components extracted from the rear side.
- : Pattern of the rear side.
- : Pattern from the side which enables seeing.

(The other layers' patterns are not indicated.)

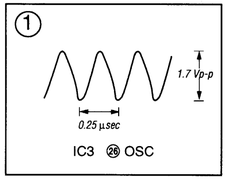
Caution:

Pattern face side: (SIDE A)	Parts on the pattern face side seen from the pattern face are indicated.
Parts face side: (SIDE B)	Parts on the parts face side seen from the parts face are indicated.

4-2. SCHEMATIC DIAGRAM (HANDSET SECTION)



● WAVEFORM

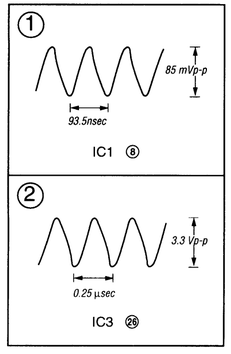


Note:

- All capacitors are in µF unless otherwise noted. pF: µµF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4 W or less unless otherwise specified.
- % : indicates tolerance.
- Δ : internal component.
- B+ : B+ Line.
- ▭ : adjustment for repair.
- Power voltage is dc 3.6V and fed with regulated dc power supply from battery terminal.
- Voltages and waveforms are dc with respect to ground under no-signal conditions.
  no mark : TALK
- Voltages are taken with a VOM (Input impedance 10 MΩ). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- —▭— : Printed inductor.
- Signal path.
  ▷ : RX (From Tel Line)
  ▶ : TX (To Tel Line)

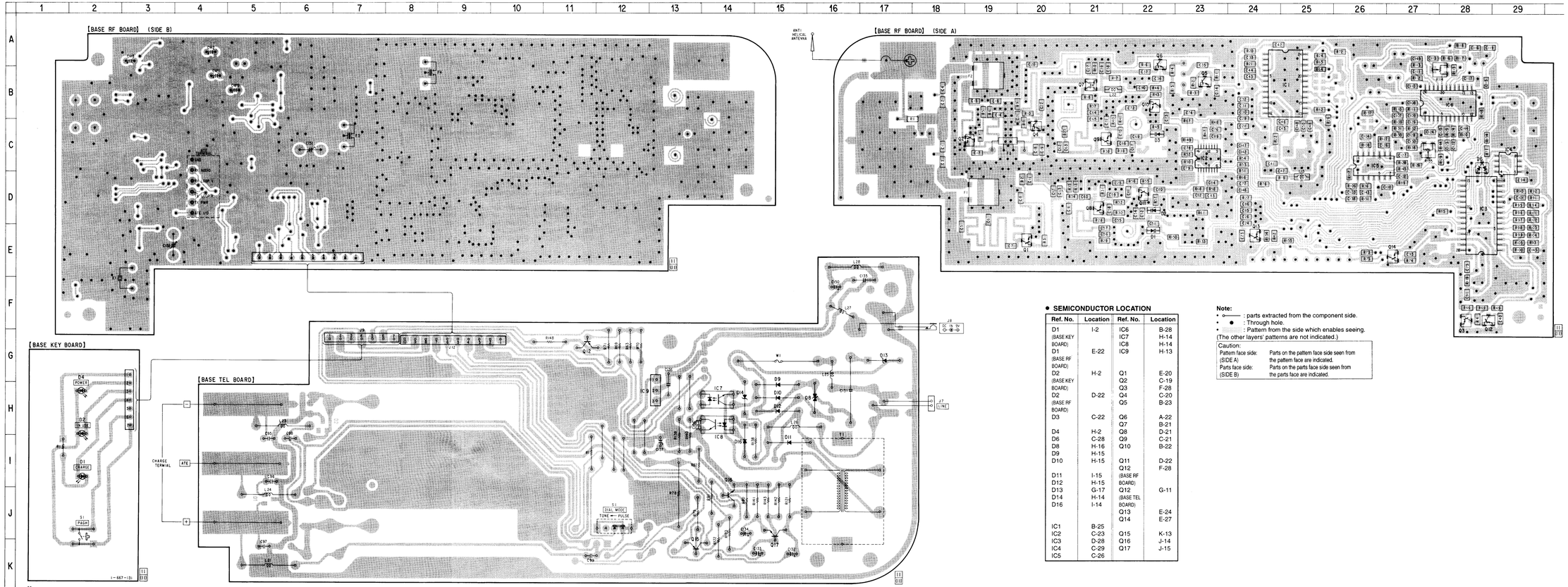
4-3. SCHEMATIC DIAGRAM (BASE UNIT SECTION)

● WAVEFORMS



Note:

- All capacitors are in µF unless otherwise noted. pF: µµF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4 W or less unless otherwise specified.
- B+ : B+ Line.
- ▭ : adjustment for repair.
- Power voltage is dc 9V and fed with regulated dc power supply from external power voltage jack (J8).
- Voltages and waveforms are dc with respect to ground under no-signal conditions.
  no mark : TALK
- Voltages are taken with a VOM (Input impedance 10 MΩ). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- ⌐▭⌐ : Printed inductor.
- Signal path.
  ▷ : RX (From Tel Line)
  ▶ : TX (To Tel Line)
  ▷ : RING



● SEMICONDUCTOR LOCATION

Ref. No.	Location	Ref. No.	Location
D1 (BASE KEY BOARD)	I-2	IC6	B-28
		IC7	H-14
		IC8	H-14
D1 (BASE RF BOARD)	E-22	IC9	H-13
D2 (BASE KEY BOARD)	H-2	Q1	E-20
		Q2	C-19
		Q3	F-28
D2 (BASE RF BOARD)	D-22	Q4	C-20
		Q5	B-23
D3	C-22	Q6	A-22
		Q7	B-21
D4	H-2	Q8	D-21
D6	C-28	Q9	C-21
D8	H-16	Q10	B-22
D9	H-15		
D10	H-15	Q11	D-22
		Q12 (BASE RF BOARD)	F-28
D11	I-15		
D12	H-15		
D13	G-17	Q12 (BASE TEL BOARD)	G-11
D14	H-14		
D16	I-14	Q13	E-24
		Q14	E-27
IC1	B-25		
IC2	C-23	Q15	K-13
IC3	D-28	Q16	J-14
IC4	C-29	Q17	J-15
IC5	C-26		

Note:

- ○——: parts extracted from the component side.
- ●: Through hole.
- ▪: Pattern from the side which enables seeing.

(The other layers' patterns are not indicated.)

Caution:	
Pattern face side: (SIDE A)	Parts on the pattern face side seen from the pattern face are indicated.
Parts face side: (SIDE B)	Parts on the parts face side seen from the parts face are indicated.

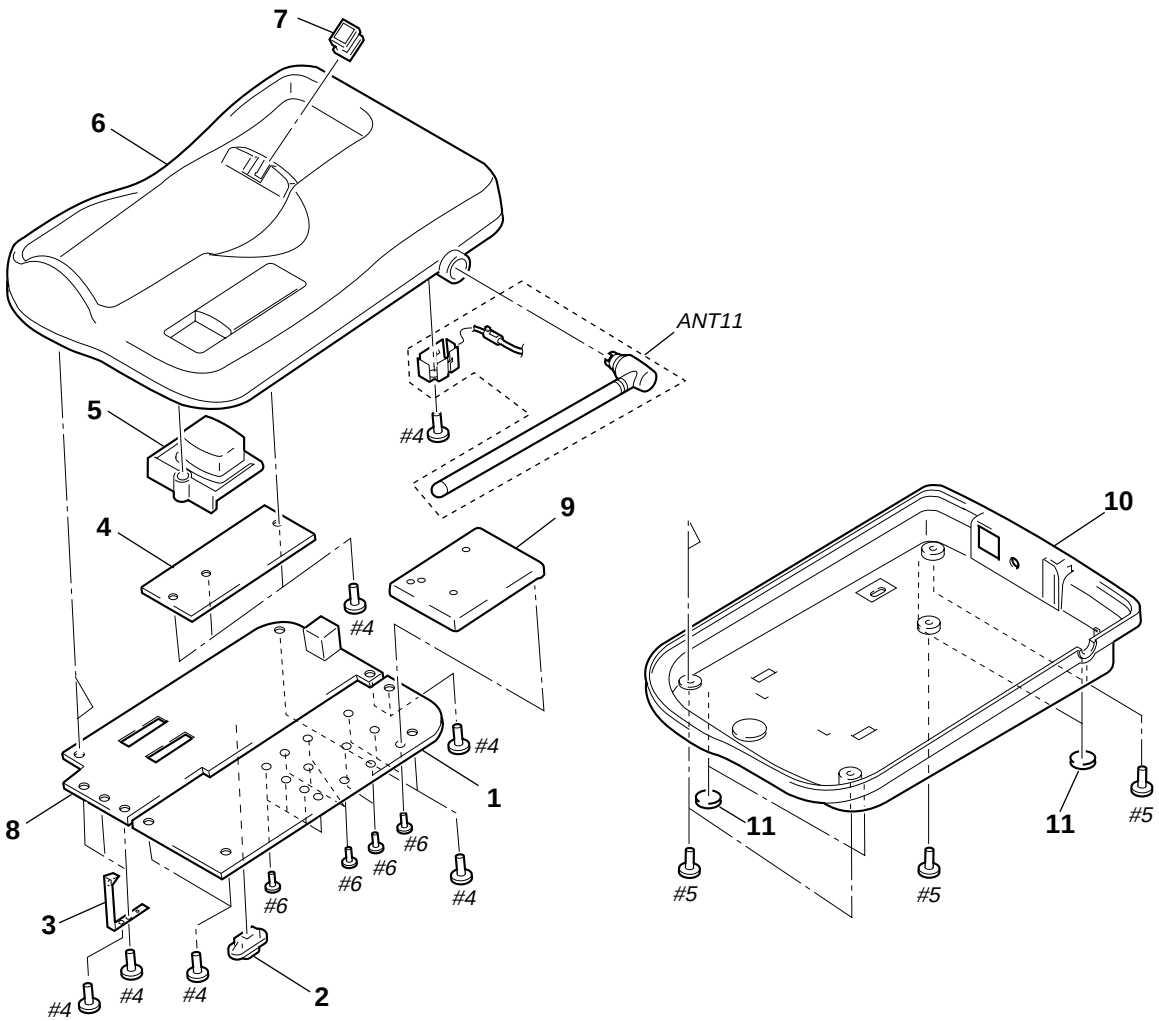
5. EXPLODED VIEWS

NOTE :

- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Color indication of Appearance Parts
  Example :
  KNOB, BALANCE (WHITE) ••• (RED)
  ↑ ↑
  Parts color Cabinet's color
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of this parts list.
- Abbreviation
  C&SA : Central & South America

5-1. BASE UNIT SECTION

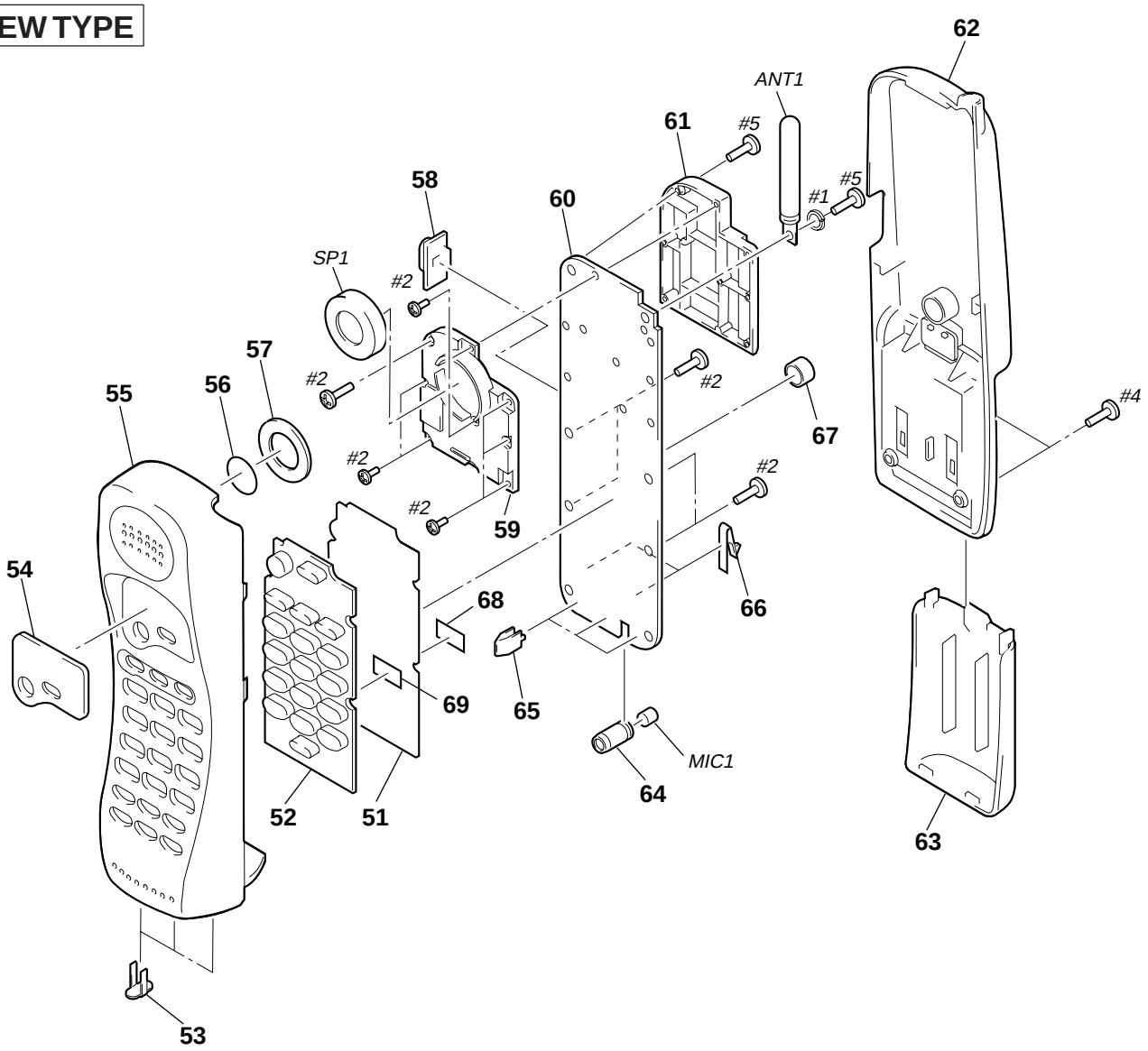
NEW TYPE



Ref. No.	Part No.	Description	Remark
* 1	A-3672-418-A	BASE RF BOARD, COMPLETE	
2	3-023-846-01	KNOB (SLIDE) (BLACK)	
2	3-023-846-11	KNOB (SLIDE) (CREAM) (US)	
3	3-017-311-01	TERMINAL (CHARGE BASE)	
* 4	1-667-131-11	BASE KEY BOARD	
5	3-017-307-01	BUTTON (PAGE) (BLACK)	
5	3-017-307-11	BUTTON (PAGE) (CREAM) (US)	
6	3-023-845-01	CABINET (UPPER), BASE (including LENS (LED)) (BLACK)	
6	3-023-845-11	CABINET (UPPER), BASE (including LENS (LED)) (CREAM) (US)	
7	3-011-485-01	HOOK (BLACK)	
7	3-011-485-21	HOOK (CREAM) (US)	
* 8	A-3672-419-A	BASE TEL BOARD, COMPLETE	
* 9	3-011-466-01	CASE (BASE), SHIELD	
10	3-023-844-01	CABINET (LOWER), BASE (BLACK) (US,Canadian, C&SA)	
10	3-023-844-11	CABINET (LOWER), BASE (CREAM) (US)	
10	3-023-844-21	CABINET (LOWER), BASE (BLACK) (E)	
11	3-383-270-01	FOOT, RUBBER	
ANT11	1-501-999-11	ANTENNA (BLACK)	
ANT11	1-501-999-21	ANTENNA (CREAM) (US)	

5-2. HANDSET SECTION

NEW TYPE



Ref. No.	Part No.	Description	Remark
51	1-771-178-11	SWITCH, SHEET	
52	1-771-177-11	SWITCH, RUBBER KEY (BLACK)	
52	1-771-177-21	SWITCH, RUBBER KEY (CREAM) (US)	
53	3-016-287-01	TERMINAL, CHARGE	
54	3-016-283-01	PANEL	
55	3-016-280-01	CABINET (FRONT), HAND (BLACK)	
55	3-016-280-11	CABINET (FRONT), HAND (CREAM) (US)	
56	3-012-611-01	SHEET (RECEIVER)	
57	3-372-738-01	GASKET (RECEIVER) (TWN)	
58	3-016-284-01	KNOB (VOL) (BLACK)	
58	3-016-284-11	KNOB (VOL) (CREAM) (US)	
* 59	3-016-289-01	CASE (FRONT), SHIELD	
* 60	A-3672-393-A	HAND MAIN BOARD, COMPLETE	
* 61	3-012-337-01	CASE (REAR), SHIELD	
62	3-016-281-01	CABINET (REAR), HAND (BLACK)	(US,Canadian)

Ref. No.	Part No.	Description	Remark
62	3-016-281-11	CABINET (REAR), HAND (BLACK) (E)	
62	3-016-281-21	CABINET (REAR), HAND (CREAM) (US)	
63	3-016-279-01	LID, BATTERY CASE (BLACK)	
63	3-016-279-11	LID, BATTERY CASE (CREAM) (US)	
64	3-016-288-01	HOLDER (MIC)	
65	3-016-290-01	TERMINAL (CHARGE HAND)	
66	3-016-291-01	TERMINAL (CHARGE HAND)	
67	3-016-285-01	HOLDER (BUZZER)	
68	3-020-780-01	TAPE, CONDUCTIVE	
69	3-023-378-01	SHEET (PVC)	
ANT1	1-501-951-11	ANTENNA (BLACK)	
ANT1	1-501-951-21	ANTENNA (CREAM) (US)	
MIC1	1-542-356-11	MICROPHONE, ELECTRET CONDENSER	(CMS-64)
SP1	1-505-593-11	SPEAKER (2.8cm)	

6. ELECTRICAL PARTS LIST

BASE KEY **BASE RF**

NEW TYPE

NOTE :

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE :Metal oxide-film resistor
  F : nonflammable
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u : μ , for example :
  uA.... : μ A.... , uPA.... : μ PA....
  uPB.... : μ PB.... , uPC.... : μ PC....
  uPD.... : μ PD....
- CAPACITORS
  uF : μ F
- COILS
  uH : μ H
- Abbreviation
  C&SA : Central & South America

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
*	1-667-131-11	BASE KEY BOARD			
		**********			
		< DIODE >			
D1	8-719-031-09	LED SLB-25MR3F (CHARGE)			
D2	8-719-031-00	LED SLB-25MG3F (IN USE)			
D4	8-719-031-00	LED SLB-25MG3F (POWER)			
		< RESISTOR >			
R1	1-247-814-11	CARBON	200	5%	1/4W
		< SWITCH >			
S1	1-554-937-11	SWITCH, KEY BOARD (PAGE)			
**********					
*	A-3672-418-A	BASE RF BOARD, COMPLETE			
		**********			
*	3-011-466-01	CASE (BASE), SHIELD			
	3-023-846-01	KNOB (SLIDE) (BLACK)			
	3-023-846-11	KNOB (SLIDE) (CREAM) (US)			
	3-017-311-01	TERMINAL (CHARGE BASE)			
	7-685-104-19	SCREW +BTP 2X6 TYPE2			
		< CAPACITOR >			
C1	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C2	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C3	1-162-912-11	CERAMIC CHIP	7PF	0.25PF	50V
C4	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C5	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C6	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C7	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C8	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C9	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C11	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C12	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C13	1-162-907-11	CERAMIC CHIP	2PF	0.5PF	50V
C14	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C15	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C16	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C17	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C18	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C19	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V

Ref. No.	Part No.	Description			Remark
C20	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C21	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C22	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C23	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C24	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C25	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C26	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C27	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C28	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C29	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C30	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C31	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C32	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C33	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C34	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C35	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C36	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C37	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C38	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C39	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C40	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C41	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C42	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C43	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C44	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C45	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C46	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C47	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C48	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C50	1-162-922-11	CERAMIC CHIP	39PF	5%	50V
C51	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C52	1-162-913-11	CERAMIC CHIP	8PF	0.25PF	50V
C54	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C55	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C56	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C57	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C58	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C59	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C60	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C62	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C63	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C64	1-162-923-11	CERAMIC CHIP	47PF	5%	50V

BASE RF

Ref. No.	Part No.	Description			Remark
C65	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C66	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C67	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C69	1-162-912-11	CERAMIC CHIP	7PF	0.25PF	50V
C70	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C71	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C72	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C73	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C74	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C75	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C76	1-104-700-11	CERAMIC CHIP	0.027uF	10%	16V
C77	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C78	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C79	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C80	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C81	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C82	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C83	1-164-492-11	CERAMIC CHIP	0.15uF	10%	16V
C84	1-164-172-11	CERAMIC CHIP	0.0056uF	10%	50V
C85	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C86	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C89	1-162-979-11	CERAMIC CHIP	2700PF	10%	50V
C90	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C91	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C93	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C94	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C100	1-162-963-11	CERAMIC CHIP	680PF	10%	50V
C101	1-164-173-11	CERAMIC CHIP	0.0039uF	10%	50V
C102	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C103	1-162-977-11	CERAMIC CHIP	0.0018uF	10%	50V
C104	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C107	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C108	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C109	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C110	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C111	1-162-965-11	CERAMIC CHIP	0.0015uF	10%	50V
C112	1-115-872-11	ELECT	2.2uF	20%	50V
C113	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C115	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C116	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C117	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C118	1-126-795-11	ELECT	10uF	20%	25V
C119	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C120	1-115-872-11	ELECT	2.2uF	20%	50V
C121	1-126-795-11	ELECT	10uF	20%	25V
C122	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C123	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C124	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C125	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C126	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C127	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C128	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C129	1-164-363-11	CERAMIC CHIP	560PF	5%	50V
C130	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C133	1-126-795-11	ELECT	10uF	20%	25V
C138	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C142	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C143	1-162-909-11	CERAMIC CHIP	4PF	0.5PF	50V
C144	1-164-730-11	CERAMIC CHIP	0.0012uF	10%	50V
C145	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C146	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C147	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C148	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C149	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
		< TRIMMER >			
C151	1-141-374-11	CAP, TRIMMER	20PF		
C152	1-141-374-11	CAP, TRIMMER	20PF		
		< DIODE >			
D1	8-719-026-45	DIODE	BB535E7989GEG		
D2	8-719-026-45	DIODE	BB535E7989GEG		
D3	8-719-026-45	DIODE	BB535E7989GEG		
D6	8-719-909-90	DIODE	BAV99		
		< FILTER,>			
F1	1-233-888-11	FILTER, BAND PASS			
F2	1-233-889-11	FILTER, BAND PASS			
F3	1-767-454-11	FILTER, SAW			
F4	1-567-107-71	FILTER, CERAMIC			
F5	1-760-785-11	FILTER, CERAMIC			
		< IC >			
IC1	8-759-459-06	IC	MC13156DWR2		
IC2	8-759-294-10	IC	TB31202FN		
IC3	8-759-480-75	IC	LSC442350DW		
IC4	8-759-044-34	IC	NM93C46EM8		
IC5	8-759-060-00	IC	BA10324AF		
IC6	8-759-479-97	IC	TA31103F		
		< COIL >			
L13	1-412-599-11	INDUCTOR CHIP	3.3uH		
L22	1-412-599-11	INDUCTOR CHIP	3.3uH		
		< TRANSISTOR >			
Q1	8-729-923-31	TRANSISTOR	2SC4083-T106P		
Q2	8-729-023-47	TRANSISTOR	2SC4227(R35)		
Q3	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q4	8-729-145-13	TRANSISTOR	2SC3356-(R25)		
Q5	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q6	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q7	8-729-041-22	TRANSISTOR	CF739R		
Q8	8-729-923-31	TRANSISTOR	2SC4083-T106P		
Q9	8-729-923-31	TRANSISTOR	2SC4083-T106P		
Q10	8-729-923-31	TRANSISTOR	2SC4083-T106P		
Q11	8-729-923-31	TRANSISTOR	2SC4083-T106P		
Q12	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q13	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q14	T-941-615-31	TRANSISTOR	MMBT3904LT1		
		< RESISTOR >			
R1	1-216-296-00	METAL CHIP	0	5%	1/8W
R2	1-216-809-11	METAL CHIP	100	5%	1/16W
R3	1-216-839-11	METAL CHIP	33K	5%	1/16W
R4	1-216-841-11	METAL CHIP	47K	5%	1/16W
R5	1-218-447-11	METAL GLAZE	62K	5%	1/16W

Ref. No.	Part No.	Description			Remark
R6	1-216-809-11	METAL CHIP	100	5%	1/16W
R7	1-216-817-11	METAL CHIP	470	5%	1/16W
R8	1-216-844-11	METAL CHIP	82K	5%	1/16W
R9	1-216-813-11	METAL CHIP	220	5%	1/16W
R10	1-216-805-11	METAL CHIP	47	5%	1/16W
R11	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R12	1-216-852-11	METAL CHIP	390K	5%	1/16W
R13	1-216-813-11	METAL CHIP	220	5%	1/16W
R14	1-216-815-11	METAL CHIP	330	5%	1/16W
R15	1-216-821-11	METAL CHIP	1K	5%	1/16W
R16	1-216-847-11	METAL CHIP	150K	5%	1/16W
R17	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R18	1-216-815-11	METAL CHIP	330	5%	1/16W
R19	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R20	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R21	1-216-815-11	METAL CHIP	330	5%	1/16W
R22	1-216-817-11	METAL CHIP	470	5%	1/16W
R24	1-216-845-11	METAL CHIP	100K	5%	1/16W
R25	1-216-037-00	METAL CHIP	330	5%	1/10W
R26	1-216-845-11	METAL CHIP	100K	5%	1/16W
R27	1-216-833-11	METAL CHIP	10K	5%	1/16W
R28	1-216-681-11	METAL CHIP	18K	0.5%	1/10W
R29	1-218-287-11	METAL CHIP	200	5%	1/16W
R30	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R31	1-216-635-11	METAL CHIP	220	0.5%	1/10W
R32	1-218-482-11	METAL CHIP	430	5%	1/16W
R33	1-216-808-11	METAL CHIP	82	5%	1/16W
R34	1-202-922-11	METAL CHIP	110	5%	1/16W
R35	1-216-808-11	METAL CHIP	82	5%	1/16W
R36	1-216-857-11	METAL CHIP	1M	5%	1/16W
R37	1-216-809-11	METAL CHIP	100	5%	1/16W
R38	1-216-679-11	METAL CHIP	15K	0.5%	1/10W
R39	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R40	1-216-635-11	METAL CHIP	220	0.5%	1/10W
R41	1-216-817-11	METAL CHIP	470	5%	1/16W
R42	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R43	1-216-840-11	METAL CHIP	39K	5%	1/16W
R44	1-216-821-11	METAL CHIP	1K	5%	1/16W
R45	1-216-833-11	METAL CHIP	10K	5%	1/16W
R46	1-216-677-11	METAL CHIP	12K	5%	1/16W
R47	1-218-294-11	METAL GLAZE	30K	5%	1/16W
R48	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R49	1-216-845-11	METAL CHIP	100K	5%	1/16W
R50	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R51	1-216-833-11	METAL CHIP	10K	5%	1/16W
R52	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R53	1-216-833-11	METAL CHIP	10K	5%	1/16W
R54	1-216-833-11	METAL CHIP	10K	5%	1/16W
R55	1-216-840-11	METAL CHIP	39K	5%	1/16W
R56	1-216-821-11	METAL CHIP	1K	5%	1/16W
R57	1-216-833-11	METAL CHIP	10K	5%	1/16W
R58	1-216-833-11	METAL CHIP	10K	5%	1/16W
R60	1-216-815-11	METAL CHIP	330	5%	1/16W
R61	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R62	1-216-845-11	METAL CHIP	100K	5%	1/16W
R64	1-218-447-11	METAL GLAZE	62K	5%	1/16W
R65	1-216-853-11	METAL CHIP	470K	5%	1/16W
R66	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R67	1-216-833-11	METAL CHIP	10K	5%	1/16W
R68	1-216-833-11	METAL CHIP	10K	5%	1/16W
R69	1-216-695-11	METAL CHIP	68K	0.5%	1/10W
R72	1-216-837-11	METAL CHIP	22K	5%	1/16W
R73	1-216-845-11	METAL CHIP	100K	5%	1/16W
R74	1-216-845-11	METAL CHIP	100K	5%	1/16W
R75	1-216-821-11	METAL CHIP	1K	5%	1/16W
R76	1-216-838-11	METAL CHIP	27K	5%	1/16W
R77	1-216-845-11	METAL CHIP	100K	5%	1/16W
R85	1-216-841-11	METAL CHIP	47K	5%	1/16W
R89	1-216-834-11	METAL CHIP	12K	5%	1/16W
R90	1-216-834-11	METAL CHIP	12K	5%	1/16W
R91	1-216-864-11	METAL CHIP	0	5%	1/16W
R92	1-216-835-11	METAL CHIP	15K	5%	1/16W
R93	1-216-841-11	METAL CHIP	47K	5%	1/16W
R94	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R95	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R96	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R97	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R98	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R99	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R100	1-216-682-11	METAL CHIP	20K	0.5%	1/10W
R101	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R102	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R103	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R104	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R105	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R106	1-216-833-11	METAL CHIP	10K	5%	1/16W
R107	1-216-833-11	METAL CHIP	10K	5%	1/16W
R108	1-216-854-11	METAL CHIP	560K	5%	1/16W
R109	1-216-848-11	METAL CHIP	180K	5%	1/16W
R110	1-216-848-11	METAL CHIP	180K	5%	1/16W
R111	1-216-848-11	METAL CHIP	180K	5%	1/16W
R112	1-216-844-11	METAL CHIP	82K	5%	1/16W
R113	1-218-448-11	METAL GLAZE	430K	5%	1/16W
R115	1-216-821-11	METAL CHIP	1K	5%	1/16W
R116	1-216-850-11	METAL CHIP	270K	5%	1/16W
R117	1-216-848-11	METAL CHIP	180K	5%	1/16W
R118	1-216-850-11	METAL CHIP	270K	5%	1/16W
R119	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R120	1-216-837-11	METAL CHIP	22K	5%	1/16W
R124	1-216-853-11	METAL CHIP	470K	5%	1/16W
R125	1-216-857-11	METAL CHIP	1M	5%	1/16W
R126	1-216-841-11	METAL CHIP	47K	5%	1/16W
R127	1-216-853-11	METAL CHIP	470K	5%	1/16W
R128	1-216-845-11	METAL CHIP	100K	5%	1/16W
R129	1-202-929-11	METAL GLAZE	360K	5%	1/16W
R130	1-216-847-11	METAL CHIP	150K	5%	1/16W
R131	1-216-847-11	METAL CHIP	150K	5%	1/16W
R132	1-216-847-11	METAL CHIP	150K	5%	1/16W
R133	1-216-821-11	METAL CHIP	1K	5%	1/16W
R134	1-216-833-11	METAL CHIP	10K	5%	1/16W
R136	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R144	1-216-864-11	METAL CHIP	0	5%	1/16W
R145	1-216-857-11	METAL CHIP	1M	5%	1/16W
R146	1-216-837-11	METAL CHIP	22K	5%	1/16W
R149	1-216-864-11	METAL CHIP	0	5%	1/16W

BASE RF **BASE TEL** **HAND MAIN**

Ref. No.	Part No.	Description			Remark
R150	1-216-833-11	METAL CHIP	10K	5%	1/16W
R151	1-216-857-11	METAL CHIP	1M	5%	1/16W
R154	1-216-837-11	METAL CHIP	22K	5%	1/16W
R155	1-216-837-11	METAL CHIP	22K	5%	1/16W
R157	1-216-864-11	METAL CHIP	0	5%	1/16W
		< VARIABLE RESISTOR >			
R114	1-228-993-00	RES, ADJ, METAL 4.7K (MODULATION LEVEL)			
R135	1-228-993-00	RES, ADJ, METAL 4.7K (TX DEVIATION)			
		< VIBRATOR >			
X1	1-577-130-11	VIBRATOR, CRYSTAL (4MHz)			
**********					
*	A-3672-419-A	BASE TEL BOARD, COMPLETE			
		**********			
		< CAPACITOR >			
C95	1-102-106-00	CERAMIC	100PF	10%	50V
C96	1-102-106-00	CERAMIC	100PF	10%	50V
C97	1-102-106-00	CERAMIC	100PF	10%	50V
C98	1-102-106-00	CERAMIC	100PF	10%	50V
C99	1-161-039-00	CERAMIC	0.001uF	10%	25V
C106	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C131	1-136-193-11	FILM	0.47uF	5%	250V
C132	1-126-795-11	ELECT	10uF	20%	25V
C134	1-115-872-11	ELECT	2.2uF	20%	50V
C135	1-161-772-11	CERAMIC	0.1uF	10%	25V
C136	1-161-055-00	CERAMIC	0.022uF	10%	25V
C137	1-126-967-11	ELECT	47uF	20%	16V
C150	1-126-096-11	ELECT	10uF	20%	35V
		< DIODE >			
D8	1-801-730-11	VARISTOR			
D9	8-719-911-55	DIODE 1N4004			
D10	8-719-911-55	DIODE 1N4004			
D11	8-719-911-55	DIODE 1N4004			
D12	8-719-911-55	DIODE 1N4004			
D13	8-719-109-97	DIODE RD6.8ESB2			
D14	8-719-109-97	DIODE RD6.8ESB2			
D16	8-719-055-76	DIODE 1N4148			
		< IC >			
IC7	8-719-821-66	IC PHOTO COUPLER TLP627			
IC8	8-719-018-89	IC PHOTO COUPLER LTV817-C			
IC9	8-759-701-56	IC NJM78M05FA			
		< JACK >			
J7	1-565-999-11	JACK, MODULAR 2P (LINE)			
J8	1-580-727-11	JACK (DC IN 9V)			
		< COIL >			
L21	1-408-117-00	INDUCTOR	10uH		
L23	1-408-117-00	INDUCTOR	10uH		
L24	1-408-117-00	INDUCTOR	10uH		
L25	1-408-117-00	INDUCTOR	10uH		
L26	1-408-117-00	INDUCTOR	10uH		

Ref. No.	Part No.	Description			Remark
L27	1-408-117-00	INDUCTOR	10uH		
L28	1-408-117-00	INDUCTOR	10uH		
		< TRANSISTOR >			
Q12	8-729-113-08	TRANSISTOR 2N3906			
Q15	8-729-113-08	TRANSISTOR 2N3906			
Q16	8-729-139-04	TRANSISTOR 2N3904			
Q17	8-729-139-04	TRANSISTOR 2N3904			
		< RESISTOR >			
R1	1-247-855-11	CARBON	10K	5%	1/4W
R63	1-247-847-11	CARBON	4.7K	5%	1/4W
R69	1-247-847-11	CARBON	4.7K	5%	1/4W
R70	1-247-847-11	CARBON	4.7K	5%	1/4W
R71	1-247-814-11	CARBON	200	5%	1/4W
R78	1-215-862-11	METAL OXIDE	68	5%	1W F
R79	1-247-855-11	CARBON	10K	5%	1/4W
R80	1-247-871-11	CARBON	47K	5%	1/4W
R81	1-249-427-11	CARBON	6.8K	5%	1/4W
R82	1-247-871-11	CARBON	47K	5%	1/4W
R121	1-249-412-11	CARBON	390	5%	1/4W
R122	1-215-456-00	METAL	30K	1%	1/4W
R123	1-215-436-00	METAL	4.3K	1%	1/4W
R138	1-247-855-11	CARBON	10K	5%	1/4W
R139	1-249-427-11	CARBON	6.8K	5%	1/4W
R140	1-216-818-11	CARBON	560	5%	1/4W
R141	1-215-387-11	METAL	39	1%	1/4W
R142	1-215-431-00	METAL	2.7K	1%	1/4W
R143	1-215-421-00	METAL	1K	1%	1/4W
R148	1-247-814-11	CARBON	200	5%	1/4W
		< SWITCH >			
S1	1-571-377-11	SWITCH, SLIDE (DIAL MODE)			
		< TRANSFORMER >			
T1	1-431-208-11	TRANSFORMER, LINE			
		< FUSE >			
W1	1-533-842-11	FUSE (250mA)			
**********					
*	A-3672-393-A	HAND MAIN BOARD, COMPLETE			
		**********			
	1-771-178-11	SWITCH, SHEET			
	3-012-337-01	CASE (REAR), SHIELD			
	3-016-288-01	HOLDER (MIC)			
	3-016-289-01	CASE (FRONT), SHIELD			
	3-016-290-01	TERMINAL (CHARGE HAND)			
	3-016-291-01	TERMINAL (CHARGE HAND)			
	7-685-105-19	SCREW +P 2X8 TYPE2 NON-SLIT			
		< BUZZER >			
BZ1	1-505-594-21	BUZZER			
		< CAPACITOR >			
C1	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V

Ref. No.	Part No.	Description			Remark
C2	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C3	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C4	1-162-918-11	CERAMIC CHIP	18PF	5%	50V
C5	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C6	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C7	1-162-933-11	CERAMIC CHIP	2.5PF	0.25PF	50V
C8	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C9	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C11	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C12	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C13	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C14	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C15	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C16	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C17	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C18	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C19	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C20	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C21	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C22	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C23	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C24	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C25	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C26	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C27	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C28	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C29	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C30	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C31	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C32	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C33	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C34	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C35	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C36	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C37	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C38	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C39	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C41	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C42	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C43	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C44	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C45	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C46	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C47	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C48	1-162-922-11	CERAMIC CHIP	39PF	5%	50V
C50	1-162-907-11	CERAMIC CHIP	2PF	0.25PF	50V
C51	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C52	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C55	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C56	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C57	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C58	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C59	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C60	1-162-906-11	CERAMIC CHIP	1.5PF	0.25PF	50V
C62	1-162-907-11	CERAMIC CHIP	2PF	0.25PF	50V
C63	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C64	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C65	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C66	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C67	1-162-907-11	CERAMIC CHIP	2PF	0.25PF	50V
C69	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C70	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C71	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C72	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C73	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C74	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C75	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C76	1-104-700-11	CERAMIC CHIP	0.027uF	10%	16V
C77	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
C78	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C79	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C80	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C81	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V
C82	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V
C83	1-164-298-11	CERAMIC CHIP	0.15uF	10%	16V
C84	1-164-172-11	CERAMIC CHIP	5600PF	10%	25V
C85	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C86	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C89	1-162-979-11	CERAMIC CHIP	2700PF	10%	50V
C90	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C91	1-162-918-11	CERAMIC CHIP	18PF	5%	50V
C93	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C96	1-126-791-11	ELECT	10uF	20%	16V
C99	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C100	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C101	1-162-977-11	CERAMIC CHIP	0.0018uF	10%	50V
C102	1-135-208-11	TANTAL. CHIP	1uF	10%	10V
C103	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C104	1-162-957-11	CERAMIC CHIP	220PF	5%	50V
C105	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C106	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C107	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C108	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C109	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C110	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C111	1-162-965-11	CERAMIC CHIP	0.0015uF	10%	50V
C112	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C113	1-135-212-21	TANTAL. CHIP	2.2uF	20%	20V
C114	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C116	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C117	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C118	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C119	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C121	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C122	1-135-212-21	TANTAL. CHIP	2.2uF	20%	20V
C123	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C124	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C125	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C126	1-135-212-21	TANTAL. CHIP	2.2uF	20%	20V
C127	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C128	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C129	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C130	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C131	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C132	1-162-957-11	CERAMIC CHIP	220PF	5%	50V

HAND MAIN

Ref. No.	Part No.	Description			Remark
C133	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
C134	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C135	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
C136	1-162-920-11	CERAMIC CHIP	27PF	5%	50V
C138	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C139	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C140	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
		< TRIMMER >			
C87	1-141-374-11	CAP, TRIMMER	20PF		
C92	1-141-374-11	CAP, TRIMMER	20PF		
		< DIODE >			
D1	8-719-026-45	DIODE	BB535E79B9GEG		
D2	8-719-026-45	DIODE	BB535E79B9GEG		
D3	8-719-026-45	DIODE	BB535E79B9GEG		
D4	8-719-062-55	LED	MS31D (BATT LOW)		
D5	8-719-062-54	LED	MG31D (TALK)		
D6	8-719-047-37	DIODE	BAS16		
D7	8-719-909-90	DIODE	BAV99		
D8	8-719-909-90	DIODE	BAV99		
D14	9-940-016-13	DIODE	SM12D41		
		< FILTER>			
F1	1-233-888-11	FILTER, BAND PASS			
F2	1-233-889-11	FILTER, BAND PASS			
F3	1-767-472-11	FILTER, SAW			
F4	1-567-107-71	FILTER, CERAMIC			
F5	1-760-785-11	FILTER, CERAMIC			
		< IC >			
IC1	8-759-461-45	IC	MC13156FB		
IC2	8-759-294-10	IC	TB31202FN		
IC3	8-759-480-74	IC	LSC442349DW		
IC5	8-759-060-00	IC	BA10324AF		
IC7	8-759-479-97	IC	TA31103F		
IC11	8-759-480-76	IC	LP2953IM		
		< COIL >			
L2	1-412-599-11	INDUCTOR CHIP	3.3uH		
L13	1-412-599-11	INDUCTOR CHIP	3.3uH		
		< MICROPHONE>			
MIC1	1-542-356-11	MICROPHONE, ELECTRET CONDENSER			(CMS-64)
		< TRANSISTOR >			
Q1	8-729-923-31	TRANSISTOR	2SC4083		
Q2	8-729-029-47	TRANSISTOR	2SC4227(R35)		
Q4	8-729-145-13	TRANSISTOR	2SC3356-(R25)		
Q5	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q6	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q7	8-729-041-22	TRANSISTOR	CF739R		
Q8	8-729-923-31	TRANSISTOR	2SC4083		
Q9	8-729-923-31	TRANSISTOR	2SC4083		
Q10	8-729-923-31	TRANSISTOR	2SC4083		
Q11	8-729-923-31	TRANSISTOR	2SC4083		

Ref. No.	Part No.	Description			Remark
Q12	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q13	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q14	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q15	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q16	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q17	T-941-615-31	TRANSISTOR	MMBT3904LT1		
Q18	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q19	8-729-026-07	TRANSISTOR	MMBT3906LT1		
Q20	T-941-615-31	TRANSISTOR	MMBT3904LT1		
		< RESISTOR >			
R1	1-216-296-00	METAL CHIP	0	5%	1/8W
R2	1-216-805-11	METAL CHIP	47	5%	1/16W
R3	1-216-835-11	METAL CHIP	15K	5%	1/16W
R5	1-216-838-11	METAL CHIP	27K	5%	1/16W
R6	1-216-806-11	METAL GLAZE	56	5%	1/16W
R7	1-216-817-11	METAL CHIP	470	5%	1/16W
R8	1-216-844-11	METAL CHIP	47K	5%	1/16W
R9	1-216-809-11	METAL CHIP	100	5%	1/16W
R10	1-216-809-11	METAL CHIP	47	5%	1/16W
R11	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R12	1-216-852-11	METAL CHIP	390K	5%	1/16W
R13	1-216-813-11	METAL CHIP	220	5%	1/16W
R14	1-216-815-11	METAL CHIP	330	5%	1/16W
R15	1-216-821-11	METAL CHIP	1K	5%	1/16W
R16	1-216-847-11	METAL CHIP	150K	5%	1/16W
R17	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R19	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R20	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R21	1-216-815-11	METAL CHIP	330	5%	1/16W
R22	1-216-817-11	METAL CHIP	470	5%	1/16W
R23	1-216-845-11	METAL CHIP	100K	5%	1/16W
R24	1-216-849-11	METAL CHIP	220K	5%	1/16W
R25	1-220-151-11	METAL CHIP	51	5%	1/16W
R26	1-216-845-11	METAL CHIP	100K	5%	1/16W
R27	1-216-833-11	METAL CHIP	10K	5%	1/16W
R28	1-216-679-11	METAL CHIP	15K	0.5%	1/10W
R29	1-216-801-11	METAL CHIP	22	5%	1/16W
R30	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R31	1-216-627-11	METAL CHIP	100	0.5%	1/10W
R32	1-216-814-11	METAL CHIP	270	5%	1/16W
R33	1-218-286-11	METAL CHIP	91	5%	1/16W
R34	1-218-285-11	METAL CHIP	75	5%	1/16W
R35	1-218-286-11	METAL CHIP	91	5%	1/16W
R36	1-216-845-11	METAL CHIP	100K	5%	1/16W
R37	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R38	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R39	1-216-675-11	METAL CHIP	10K	0.5%	1/10W
R40	1-216-627-11	METAL CHIP	100	0.5%	1/10W
R41	1-216-814-11	METAL CHIP	270	5%	1/16W
R42	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R43	1-216-836-11	METAL GLAZE	18K	5%	1/16W
R44	1-216-811-11	METAL CHIP	150	5%	1/16W
R45	1-216-833-11	METAL CHIP	10K	5%	1/16W
R47	1-218-294-11	METAL GLAZE	30K	5%	1/16W
R48	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R49	1-216-841-11	METAL CHIP	47K	5%	1/16W
R50	1-218-653-11	METAL CHIP	24	0.50%	1/16W

Ref. No.	Part No.	Description			Remark
R51	1-216-833-11	METAL CHIP	10K	5%	1/16W
R52	1-218-653-11	METAL CHIP	24	0.50%	1/16W
R53	1-216-833-11	METAL CHIP	10K	5%	1/16W
R54	1-216-833-11	METAL CHIP	10K	5%	1/16W
R55	1-216-836-11	METAL GLAZE	18K	5%	1/16W
R56	1-216-811-11	METAL CHIP	150	5%	1/16W
R57	1-216-833-11	METAL CHIP	10K	5%	1/16W
R58	1-216-833-11	METAL CHIP	10K	5%	1/16W
R60	1-216-815-11	METAL CHIP	330	5%	1/16W
R61	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R62	1-216-845-11	METAL CHIP	100K	5%	1/16W
R63	1-216-841-11	METAL CHIP	47K	5%	1/16W
R65	1-216-849-11	METAL CHIP	220K	5%	1/16W
R66	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R67	1-216-833-11	METAL CHIP	10K	5%	1/16W
R68	1-216-833-11	METAL CHIP	10K	5%	1/16W
R69	1-216-841-11	METAL CHIP	47K	5%	1/16W
R70	1-216-841-11	METAL CHIP	47K	5%	1/16W
R71	1-216-809-11	METAL CHIP	100	5%	1/16W
R72	1-216-841-11	METAL CHIP	47K	5%	1/16W
R74	1-216-845-11	METAL CHIP	100K	5%	1/16W
R75	1-216-845-11	METAL CHIP	100K	5%	1/16W
R76	1-216-818-11	METAL CHIP	560	5%	1/16W
R77	1-216-835-11	METAL CHIP	15K	5%	1/16W
R78	1-216-809-11	METAL CHIP	100	5%	1/16W
R79	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R80	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R81	1-216-849-11	METAL CHIP	220K	5%	1/16W
R82	1-216-853-11	METAL CHIP	470K	5%	1/16W
R83	1-218-759-11	METAL CHIP	200K	0.50%	1/10W
R84	1-216-699-11	METAL CHIP	100K	0.5%	1/10W
R85	1-218-758-11	METAL CHIP	180K	0.50%	1/10W
R86	1-216-699-11	METAL CHIP	100K	0.5%	1/10W
R87	1-218-756-11	METAL CHIP	150K	0.50%	1/10W
R88	1-216-699-11	METAL CHIP	100K	0.5%	1/10W
R89	1-216-856-11	METAL CHIP	820K	5%	1/16W
R90	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R91	1-216-854-11	METAL CHIP	560K	5%	1/16W
R92	1-216-833-11	METAL CHIP	10K	5%	1/16W
R93	1-216-833-11	METAL CHIP	10K	5%	1/16W
R94	1-216-835-11	METAL CHIP	15K	5%	1/16W
R95	1-216-845-11	METAL CHIP	100K	5%	1/16W
R96	1-219-570-11	METAL GLAZE	10M	5%	1/16W
R97	1-216-841-11	METAL CHIP	47K	5%	1/16W
R98	1-216-833-11	METAL CHIP	10K	5%	1/16W
R99	1-216-841-11	METAL CHIP	47K	5%	1/16W
R100	1-216-821-11	METAL CHIP	1K	5%	1/16W
R101	1-216-833-11	METAL CHIP	10K	5%	1/16W
R102	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R103	1-218-448-11	METAL GLAZE	430K	5%	1/16W
R105	1-216-849-11	METAL CHIP	220K	5%	1/16W
R106	1-216-833-11	METAL CHIP	10K	5%	1/16W
R107	1-216-833-11	METAL CHIP	10K	5%	1/16W
R108	1-216-848-11	METAL CHIP	180K	5%	1/16W
R109	1-216-848-11	METAL CHIP	180K	5%	1/16W
R110	1-216-848-11	METAL CHIP	180K	5%	1/16W
R111	1-216-845-11	METAL CHIP	100K	5%	1/16W
R112	1-216-856-11	METAL CHIP	820K	5%	1/16W
R114	1-216-821-11	METAL CHIP	1K	5%	1/16W
R115	1-216-844-11	METAL CHIP	82K	5%	1/16W
R116	1-216-856-11	METAL CHIP	820K	5%	1/16W
R117	1-216-815-11	METAL CHIP	330	5%	1/16W
R120	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R121	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R122	1-216-821-11	METAL CHIP	1K	5%	1/16W
R123	1-216-853-11	METAL CHIP	470K	5%	1/16W
R124	1-216-835-11	METAL CHIP	15K	5%	1/16W
R125	1-216-853-11	METAL CHIP	470K	5%	1/16W
R126	1-216-864-11	METAL CHIP	0	5%	1/16W
R127	1-216-853-11	METAL CHIP	470K	5%	1/16W
R128	1-218-331-11	METAL GLAZE	51K	5%	1/16W
R129	1-216-847-11	METAL CHIP	150K	5%	1/16W
R130	1-216-847-11	METAL CHIP	150K	5%	1/16W
R131	1-216-847-11	METAL CHIP	150K	5%	1/16W
R132	1-216-821-11	METAL CHIP	1K	5%	1/16W
R133	1-216-835-11	METAL CHIP	15K	5%	1/16W
R134	1-216-845-11	METAL CHIP	100K	5%	1/16W
R135	1-216-856-11	METAL CHIP	820K	5%	1/16W
R137	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R138	1-216-821-11	METAL CHIP	1K	5%	1/16W
R139	1-216-799-11	METAL CHIP	15	5%	1/16W
R140	1-216-849-11	METAL CHIP	220K	5%	1/16W
R141	1-216-841-11	METAL CHIP	47K	5%	1/16W
R142	1-216-817-11	METAL CHIP	470	5%	1/16W
R143	1-216-845-11	METAL CHIP	100K	5%	1/16W
R144	1-216-857-11	METAL CHIP	1M	5%	1/16W
R145	1-216-857-11	METAL CHIP	1M	5%	1/16W
R146	1-216-857-11	METAL CHIP	1M	5%	1/16W
R147	1-216-854-11	METAL CHIP	560K	5%	1/16W
		< VARIABLE RESISTOR >			
R113	1-238-664-11	RES, ADJ, CERMET	10K (DEMODULATION LEVEL)		
R119	1-238-664-11	RES, ADJ, CERMET	10K (TX DEVIATION)		
		< SWITCH >			
S19	1-571-377-11	SWITCH, SLIDE (VOL)			
		< SPEAKER >			
SP1	1-505-593-11	SPEAKER (2.8cm)			
		< VIBRATOR >			
X1	1-577-130-11	VIBRATOR, CRYSTAL (4MHz)			
**********					
		MISCELLANEOUS			
		**********			
51	1-771-178-11	SWITCH, SHEET			
52	1-771-177-11	SWITCH, RUBBER KEY (BLACK)			
52	1-771-177-21	SWITCH, RUBBER KEY (CREAM) (US)			
ANT1	1-501-951-11	ANTENNA (BLACK)			
ANT1	1-501-951-21	ANTENNA (CREAM) (US)			
ANT11	1-501-999-11	ANTENNA (BLACK)			
ANT11	1-501-999-21	ANTENNA (CREAM) (US)			

Ref. No.	Part No.	Description	Remark
MIC1	1-542-356-11	MICROPHONE, ELECTRET CONDENSER	(CMS-64)
SP1	1-505-593-11	SPEAKER (2.8cm)	

****

ACCESSORIES & PACKING MATERIALS
****

⚠	1-475-549-11	ADAPTOR, AC (AC-T120) (BLACK) (US,	Canadian,C&SA)
⚠	1-475-549-21	ADAPTOR, AC (AC-T120) (CREAM) (US)	
⚠	1-475-660-11	ADAPTOR, AC (AC-T47) (E)	
	1-528-769-11	BATTERY PACK (BP-T23)	
	1-696-453-21	CORD (WITH MODULAR PLUG)(LINE) (15cm)	
	1-696-454-11	CORD (WITH MODULAR PLUG)(LINE)(215cm)	
	3-010-356-11	LABEL (MEMORY)	
	3-010-453-01	CASE, WALL HOOK (BLACK)	
	3-010-453-11	CASE, WALL HOOK (CREAM) (US)	
	3-012-609-01	SPACER (WALL HOOK)	
	3-016-232-01	GUIDE, QUICK START (US)	
	3-016-232-11	GUIDE, QUICK START (Canadian)	
	3-860-376-11	MANUAL, INSTRUCTION (ENGLISH,SPANICH)	(US)
	3-860-376-21	MANUAL, INSTRUCTION (ENGLISH,FRENCH)	(Canadian)
	3-860-376-31	MANUAL, INSTRUCTION (ENGLISH,SPANISH,	RUSSIAN,CHINESE) (E)
	3-860-376-41	MANUAL, INSTRUCTION (ENGLISH,SPANISH,	PORTUGUESE) (C&SA)
	7-621-849-40	SCREW,WOOD +R 3.1X25	

****

****
HARDWARE LIST
****

#1	7-623-208-22	SW 3,TYPE 2
#2	7-685-105-19	SCREW +P 2X8 TYPE2 NON-SLIT
#4	7-685-547-19	SCREW +BTP 3X10 TYPE2 N-S
#5	7-685-548-19	SCREW +BTP 3X12 TYPE2 N-S
#6	7-685-104-19	SCREW +BTP 2X6 TYPE2

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

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SPP-930

SONY

SERVICE MANUAL

US Model
Canadian Model
E Model

CORRECTION - 2

Fill this Correction with the Service Manual.

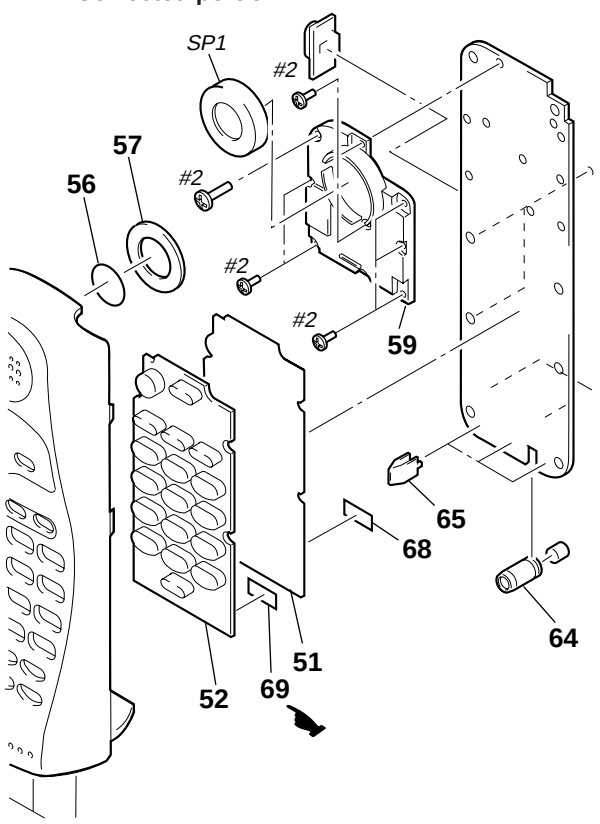
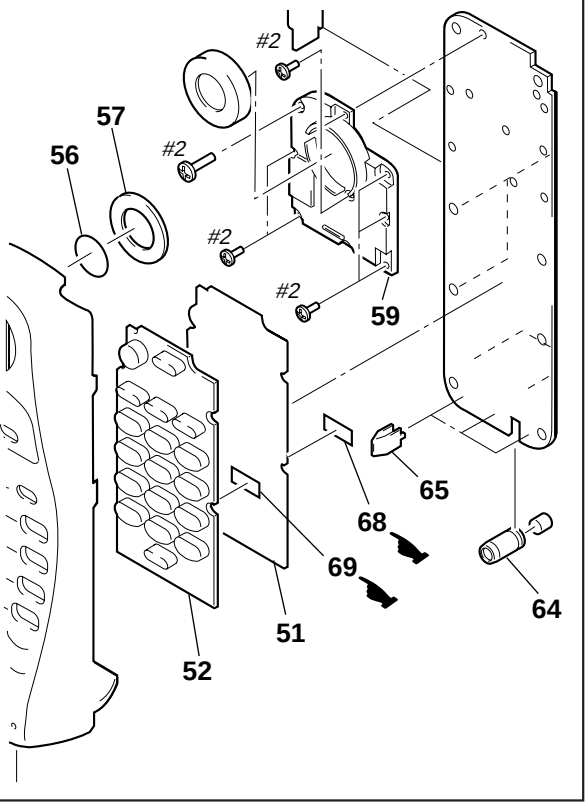
Subject :
ELECTRICAL PARTS LIST AND EXPLODED VIEWS PARTS LIST

(SPM-98029)

● **ELECTRICAL PARTS LIST** (Service Manual)

page	INCORRECT			CORRECT	
	Ref. No.	Part No.	Description	Part No.	Description
51, 57, 58	MIC1	1-542-260-31	MICROPHONE, ELECTRET CONDENSER	1-542-356-11	MICROPHONE, ELECTRET CONDENSER (CMS-64)

● **EXPLODED VIEWS** (CORRECTION-1)

page	INCORRECT	CORRECT
1	☛ : Corrected portion 	

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